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FM 17-70

DEPARTMENT OF THE ARMY FIELD MANUAL

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SIGNAL COMMUNICATION IN THE ARMORED DIVISION

DEPARTMENT OF THE ARMY •

MAY 1950

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DEPARTMENT OF THE ARMY FIELD MANUAL
FM 17-70

This manual supersedes FM 17-70, 17 April 1945

SIGNAL
COMMUNICATION
IN THE
ARMORED DIVISION



DEPARTMENT OF THE ARMY

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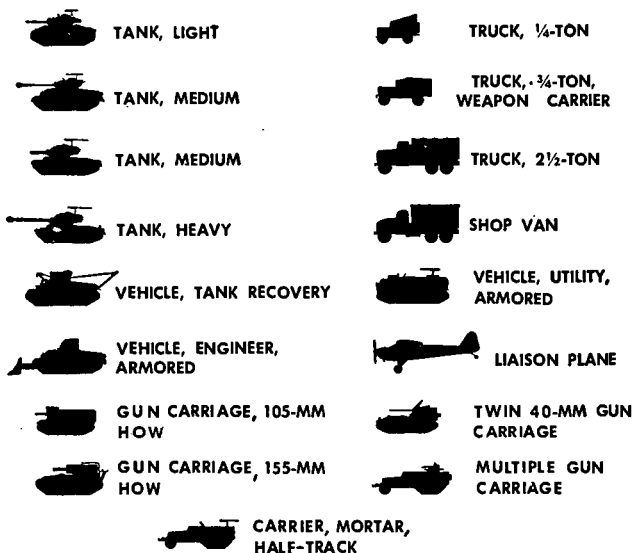
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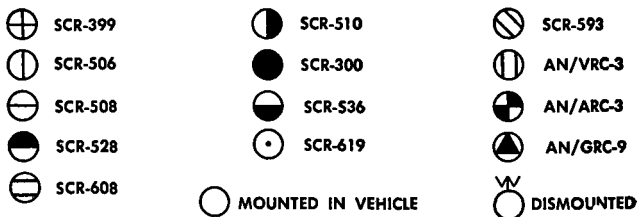
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LEGEND

VEHICLES



RADIO SETS



TELEPHONES



Figure 1. Silhouettes of vehicles, and symbols representing radio sets and telephones, as used in the charts contained in this manual.

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This manual supersedes FM 17-70, 17 April 1945

CHAPTER 1

GENERAL

Section 1. GENERAL

1. PURPOSE AND SCOPE. **a.** This manual is designed as a guide for commanders, staff officers, and other personnel in the proper utilization of the signal communication agencies and means available to the armored division for training and combat purposes. It covers signal communication activities and equipment and the personnel charged with the planning, installation, operation, and maintenance of these activities and equipment.

b. Chapter 1 covers information and communication procedures common to all units of the armored division. Each subsequent chapter presents, so far as possible, a complete discussion of communication pertinent to the various major units of the armored division. To keep each chapter as complete as possible, certain communication doctrines are repeated, where appropriate. This repetition is necessary in order to permit unit communication officers to find information concerning their particular units with a minimum of delay.

c. Figure 1 shows the symbols used in illustrating this manual.

d. SCR and equipment model numbers shown in this manual are those in present use. See the latest tables of organization and equipment and applicable technical manuals for new equipment and its characteristics.

2. SIGNAL COMMUNICATION. a. **General.** Signal communication includes all means of conveying information of any kind from one person or place to another, except by personal conversation and regular mail. It is the means by which a commander receives information and orders, and by which he directs the actions of his forces. The means of signal communication used within armored units include radio, wire, messenger, visual, and sound.

b. Definitions.

- (1) *Radio silence* is a predetermined period of time during which all radio sets (transmitters and receivers) are turned off for the purpose of enforcing radio transmission security. The period of radio silence normally is predetermined and ordered by a unit or territorial military commander.
- (2) *Listening silence* is a period of time specified by a commander during which the transmitters of all radio sets used for signal communication within the command will be turned off and will not be operated except during emergencies specifically described in orders. All receivers will remain in operation on net frequen-

cies unless special orders are issued to the contrary.

- (3) A *headquarters*, as the term is used in this manual, consists of the command group, forward echelon (also designated as command post), and rear echelon.

3. RESPONSIBILITY FOR COMMUNICATION. The division commander is responsible for the installation, operation, and maintenance of the division signal communication system. The commander may delegate certain functions and duties, but he cannot delegate responsibility. Each commander has comparable responsibilities within his unit. Even though each unit commander is charged specifically with the maintenance of adequate communication with his subordinate units, it is only through the joint efforts of all concerned that communication can be maintained, particularly during rapid movement in combat. Contact is essential and, if it is lost, its reestablishment is secured by both the subordinate and the higher unit.

4. SIGNAL COMMUNICATION PERSONNEL—GENERAL.

The signal communication personnel in the armored division are all those individuals whose primary duty is to provide communication. These personnel range from the division signal officer to the radio operators and messengers in smaller organizations. In addition, there are others whose communication duties are secondary. The latter group includes truck drivers, intelligence person-

nel, reconnaissance personnel, buglers, and each vehicle commander or crew member in whose vehicle there is a radio which he operates or uses. The principal duties of the division signal officer, and the duties of the principal communication personnel of units below the division, are as listed in the succeeding paragraphs.

5. DUTIES OF THE SIGNAL OFFICER. The division signal officer, as a member of the division special staff, is the technical adviser of the division commander and interested staff members in all matters pertaining to communication activities within the division and attached units. The division signal officer also recommends locations for proposed division command posts. Specific duties of the signal officer are to—

a. Advise the commander and staff in signal matters.

b. Exercise operational control over the armored signal company and attached signal troops.

c. Prepare paragraph 5 of the division operation order, the communication section of the division standing operating procedure (SOP), the division signal operation instructions (SOI), and the division standing signal instructions (SSI).

d. Determine the requirements for signal equipment and supplies and supervise their procurement, storage and distribution.

e. Coordinate all communication activities in the division and attached units.

f. Receive and be responsible for codes and ciphers in accordance with instructions from higher headquarters.

g. Make technical inspections of signal equipment, within limits prescribed by the commander, and recommendations relative to the care and use of such equipment.

h. Supervise activities pertaining to the signal technical intelligence, pigeon, and photographic services as they affect the division.

i. Conduct required division communication schools.

j. Supervise the installation and operation of such special communication systems as are required by the division.

k. Exercise supervision over signal communication security within the division.

l. Establish liaison with signal officers of higher and lower echelons of command on details of planning the signal communication systems and other technical matters.

6. DUTIES OF THE COMMUNICATION OFFICER. The principal duties of a communication officer within his unit generally are the same as those performed within the division by the signal officer. His actions are based upon the division standing operating procedure in all matters pertaining to the training of personnel in signal communication, the general employment of signal agencies and means, and the preparation and distribution of signal orders and procedures. In order that he may be of maximum benefit to his commander,

communication officer must be kept informed fully of the present and contemplated actions of his unit. The communication officer in most cases is also assistant S-3 Air. As such, he supervises all training within his unit in air-ground cooperation procedures, and establishes a communication system (when required) which furnishes coordination and positive control between his unit and supporting aircraft. Specific duties of a communication officer are to—

a. Advise the commander and staff on matters pertaining to communication.

b. Direct and supervise the training of all communication personnel in his unit, and conduct classes in communication subjects for these personnel, as required.

c. Prepare and publish signal orders as required and as directed by higher headquarters.

d. Determine the requirements for signal equipment and supplies, and collaborate with the unit S-4 in their procurement and distribution.

e. Conduct training within limits prescribed by the commander and higher headquarters, in the means and methods of air support normal to his unit, and in the rules and procedures incident to this support.

f. Make technical inspections of signal equipment and, within limits prescribed by the commander, make recommendations relative to the care and use of such equipment.

g. Supervise the installation, operation, and maintenance of the communication systems of his unit.

7. DUTIES OF THE ASSISTANT COMMUNICATION OFFICER. The assistant communication officer generally insures that the orders of the communication officer are carried out; he performs other duties pertaining to communication as directed by the communication officer. In the combat command and reserve command, the communication officer frequently devotes much of his time to the functions of assistant S-3 Air. Under such conditions, the assistant communication officer takes over the communication duties of the communication officer.

8. DUTIES OF THE COMMUNICATION CHIEF. The communication chief of a combat or reserve command or a battalion is the principal enlisted assistant to the communication officer. He performs duties as directed by the communication officer. These duties usually include supervising and assisting the enlisted communication personnel; keeping records relative to signal equipment, supplies, and personnel; and assisting in the preparation and distribution of signal orders and procedures. A company communication chief performs the same type of duties as a battalion or combat command communication chief. The company communication chief works directly under his company commander and assists the radio repairman as required.

9. DUTIES OF THE RADIO REPAIRMAN. Generally speaking, there is one radio repairman in each company, plus one additional repairman for each

battalion. Each of these radio repairmen performs organizational maintenance on the radio equipment in his organization. Each is a member of the maintenance section or platoon of his unit.

10. DUTIES OF THE MESSENGER. Messengers are used for carrying maps, overlays, documents, and like materials requiring physical transmission, and for carrying important tactical messages (verbal or written) when no other means are available. Messengers normally operate under the supervision and direction of the message center chief.

11. DUTIES OF THE CODE CLERK. Code clerks encrypt and decrypt messages passing through the message center or other channels in accordance with signal operation instructions. The code clerk also assists the other members of the message center in their duties by receiving and logging incoming messages and distributing them in accordance with prescribed procedures. Upon occasion, he may act as a messenger and drive light motor vehicles. It is desirable that code clerks have a knowledge of typing.

12. DUTIES OF THE RADIO OPERATOR. The radio operator establishes and maintains communication by means of the radio set to which he is assigned as an operator. The radio operator is a specialist inasmuch as he must have specialist training in International Morse Code. In addition, he should be trained further to perform the duties of a

code clerk and may be trained as a switchboard operator. He must be thoroughly familiar with signal operation instructions, radio procedures, and the maintenance of necessary records while operating a radio set. Normally, two or more operators are assigned to each radiotelegraph-telephone set. They operate in shifts in order to provide continuous service.

13. DUTIES OF THE MESSAGE CENTER CHIEF. The message center chief supervises the activities of the unit message center. He keeps a record of the effectiveness of the means of communication available and, within certain limitations, dispatches messages accordingly. He keeps a record of all messages which pass through the message center.

14. LIAISON—GENERAL. a. The purpose of liaison is to obtain by personal contact the desired cooperation, exchange of information, and coordination of effort between commanders. Each commander maintains liaison with higher headquarters, supported units, and adjacent units, by any means available.

b. Liaison may be accomplished either by personal conference between commanders (command liaison) or by means of a liaison officer or agent who represents his unit commander. Usually, both methods are employed concurrently. The liaison officer or agent remains at the headquarters to which he is sent and maintains contact with it and his own unit; the unit commanders meet

whenever the tactical situation requires that they do so.

15. STAFF COORDINATION ON SIGNAL COMMUNICATION MATTERS. If a commander is to be successful, he must have an effective and well-coordinated staff. It is necessary that the various members coordinate their activities with the signal or communication officer as follows:

a. Personnel officer (G-1 or S-1) or headquarters commandant. In collaboration with the signal or communication officer, selects the exact site of the command post.

b. Intelligence officer (G-2 or S-2). Informs the signal or communication officer of special security measures, arranges for communication with observation posts and other intelligence elements, collaborates with the signal or communication officer in the preparation of prearranged messages for intelligence purposes, and coordinates with the signal or communication officer in the intelligence evaluation of captured enemy signal equipment.

c. Operations and training officer (G-3 or S-3). Keeps the signal or communication officer informed of the tactical situation and projected plans, particularly as they concern the movement of the command post; coordinates with the signal or communication officer on the signal support required for tactical operations; establishes priorities for the installation and use of signal channels; authenticates signal operation orders and annexes; and, following consultation with the

signal or communication officer, recommends the location of the CP to the commander.

d. Supply officer (G-4 or S-4). Insures the coordination of procurement and issuance, with the signal or communication officer, of all signal equipment with the tactical plans of the commander.

16. COMMUNICATION SECURITY—GENERAL. Communication must be reliable and secure from enemy intelligence methods if military operations are to be successful. The neglect of a single aspect of communication security may result in disaster. Communication security embodies all measures designed to deny to unauthorized persons such information of military value as might be derived from friendly communication. Communication security comprises cryptographic security, transmission security, and physical security. Since most vehicles contain one or more voice radio sets, virtually all personnel of the armored division must know and practice the principles of communication security. While the commander is responsible for the maintenance of communication security, his signal or communication officer must take the necessary precautions to guarantee this security. Staff officers and signal and communication personnel must be guided by general principles, applied with a full knowledge and appreciation of existing conditions, rather than by rigid regulations. Reasonable security at all times should be the goal (fig. 2).

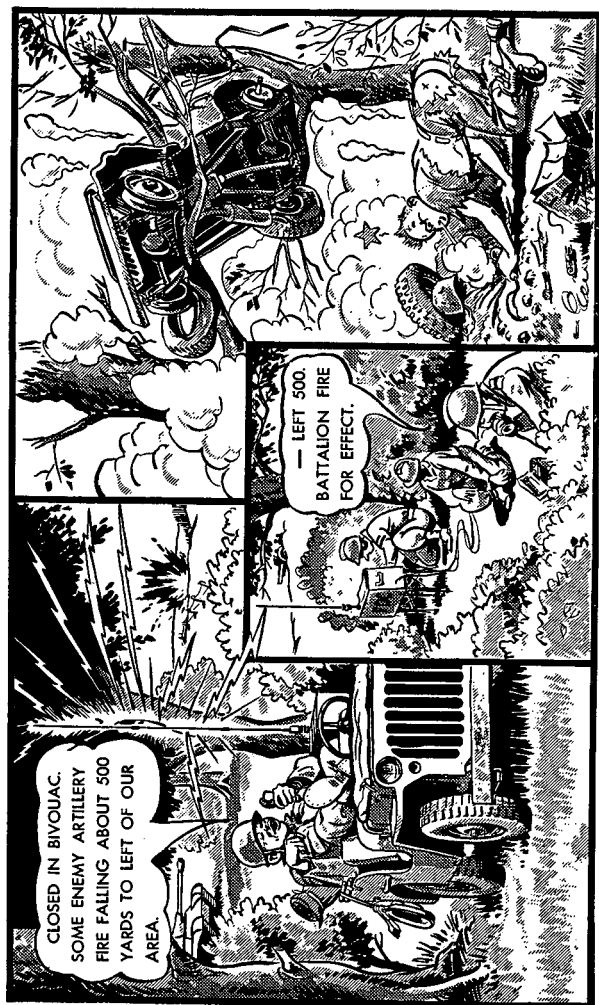


Figure 2. Reasonable security at all times should be the goal.

17. AUTHENTICATION. Authentication insures the genuineness of a message, radio station, or person. Without it, enemy stations, representing themselves as friendly, may send false messages or orders; or they may accept messages for a station, thereby preventing or delaying the delivery of messages to the proper destination. Everyone handling messages, whether he be the writer, recipient, radio operator, message center clerk, or user of radio or telephone, assures himself by proper authentication that communication is with or from the proper station or person.

18. NECESSITY FOR PROPER RADIO PROCEDURE. Because of the necessity for several radio stations to operate together in many of the radio nets in the armored division and other armored units, it is essential that radio net discipline be maintained rigidly. One of the surest methods of maintaining radio net discipline is the use of proper radio procedure by everyone in the net. When proper radio procedure is used, the number and length of transmissions in a radio net are decreased considerably, and transmission security violations are less likely to occur.

19. COMMUNICATION CENTER (COMCENTER)—GENERAL. A communication center normally is composed of a message center section, a cryptographic section, and one or more operating sections. A communication center may be established to serve a designated headquarters or an echelon of a headquarters.

20. MESSAGE CENTER—GENERAL. a. The message center is that agency in each headquarters which is charged with the routing, receipt, processing, and delivery of all official messages handled by that headquarters, except those messages which are—

- (1) Transmitted directly to the addressee by the originator, using an agent, a telephone, a radio, or a teletypewriter provided for his private use.
- (2) Handled by military or civil postal services.
- (3) Purely local messages.
- (4) Delivered directly to an addressee by a special messenger.

b. In lower echelons, the message center is also responsible for encrypting and decrypting messages.

21. ORGANIZATION AND DUTIES OF THE MESSAGE CENTER. Message centers in armored units vary in size from one man to nearly 50 men. For example, the message center of a tank or armored infantry company usually is handled by one individual whereas, in the message center section of the signal company, there are approximately 40 enlisted men, two warrant officers, and one commissioned officer. Regardless of its size, the duties of a message center remain substantially the same. The primary duty of the message center is the expeditious delivery of messages to the addressee, consistent with accuracy and security. Other duties include—

a. The maintenance of records and files incident to the processing of message traffic.

b. Determining the best means of transmitting messages.

c. Determining the proper routing of outgoing and relay messages.

d. The receipt of messages arriving by messenger.

e. Dispatching scheduled and special messengers when a separate messenger section is not established.

f. Encrypting and decrypting messages in units which do not have a separate cryptographic section.

22. OPERATIONS OF THE MESSAGE CENTER. A message center constantly must strive for consistent accuracy, speed, and security in the receipt, transmission, and delivery of authentic official message traffic by means of signal communication. The value of speed and security may be lost when messages are inaccurate upon delivery. Messages delivered to the addressee must read as originally prepared by the writer or, if paraphrasing has been necessary, the original meaning must be maintained. Any communication is valueless and frequently dangerous if the original thought of the writer is changed or if the message is not clearly intelligible when received. Errors in transmission and reception or in cryptographic processing result in confusion and loss of time and may seriously impair tactical operations. Message center personnel must learn teamwork in the processing

of large volumes of message traffic. Safeguards must be established in each situation to insure the immediate detection of errors in transmission, reception, and delivery, and procedures must be adopted to eliminate the possible repetition of mistakes. There is no substitute for accuracy in the operation of message centers. The message center is not an office of record and is neither organized nor equipped to perform stenographic or clerical work for any agency not directly a part of the message center. It does not prepare additional copies of messages for multiple distribution or perform the labor incident to the consolidation of outgoing messages. The unit standing operating procedure should outline certain basic points of procedure in operation of the message center. The efficient operation of the message center can be insured by adapting the following general functions to each particular situation:

- a. Provide a designated point to which messages and messengers may be directed.
- b. Keep informed of the current effectiveness of each available means of signal communication.
- c. Properly distribute message traffic to the available effective means of signal communication.
- d. Constantly endeavor to eliminate unnecessary delays in message handling.
- e. Maintain only those records absolutely necessary for the efficient operation of the message center.
- f. Maintain a constant and positive method of follow-up on each message transmitted, to insure prompt clearance.

g. Establish and maintain close coordination with the agencies of the organization or section responsible for the preparation and local distribution of messages.

h. Operate an efficient messenger service adapted to meet the requirements of the headquarters or echelon served.

23. CRYPTOGRAPHIC SECTION—GENERAL. A cryptographic section is composed of one or more clerks. This section is charged with encrypting or decrypting any official message transmitted or received. In many instances, below division level, the radio operator may perform the duties of a code clerk in addition to his normal duties.

24. OPERATING SECTIONS—GENERAL. Operating sections consist of the necessary personnel and equipment to operate the means of communication available to the headquarters.

25. COMMAND POST—GENERAL. A command post is the station of a unit's headquarters where the commander and staff work; it is the nerve center of the unit's communication and operations. In combat, a unit's process headquarters often is divided into a forward echelon and a rear echelon; the forward echelon is called the command post (CP). In addition, a command group often may operate out of the forward echelon. (See fig. 3.)

a. Forward echelon. The forward echelon is the command post (CP), and its primary function is

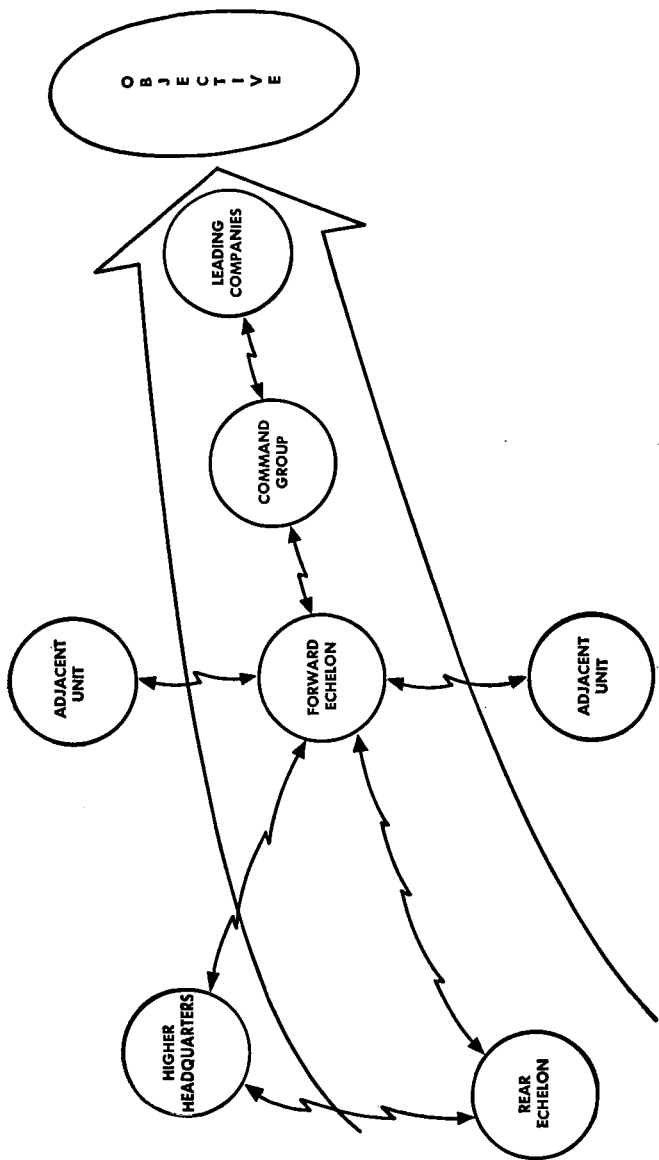


Figure 3. The echelons of a battalion headquarters.

to act as a clearing house for all information. The chief of staff or executive officer of the unit normally is located at this echelon. He directs the actions of the staff and keeps the commander informed of the over-all situation. The command post must maintain communication with higher and subordinate headquarters and also with adjacent, supported, and supporting unit headquarters. A report of any credible information received at the command post must be transmitted to the command group if it relates to the immediate situation or requires immediate action. The location of the command post depends upon communication requirements, the situation, and security. Regardless of the size of the command post, it usually derives security from the combat elements; therefore, it must be kept forward where this protection is available. Further, it must be located so as to be able to maintain communication with both the forward elements and higher headquarters.

b. Rear echelon. The rear echelon of the headquarters normally is located in the vicinity of the division or combat command trains. The function of this echelon is administrative. It consists of supply, maintenance, and medical facilities and personnel sections not needed immediately by the combat elements. Communication with the forward echelon is of prime importance to the rear echelon, for the rear echelon frequently will have communication with subordinate units only through the forward echelon.

c. Command group. The purpose of forming a

command group is to permit the commander to supervise actively the conduct of the unit's operations and to render prompt decisions. The command group is composed of the commander and such staff members and other personnel as he may designate, with necessary vehicles and equipment. The command group must be located well forward with the combat elements. Its location is not fixed and may change frequently during the course of the day as the situation develops and when the commander feels his presence is needed elsewhere. The location of the command group always must be known at the forward echelon. From the forward echelon, the command group receives pertinent information that pertains to the situation.

26. ARRANGEMENT OF THE COMMAND POST. Arrangement of the various sections of a command post will vary with each site selected, dependent upon terrain, routes into and out of the area, and the size of the headquarters. Any arrangement of the command post must provide for prompt displacement. During combat and other operations, command posts of units up to and including the combat command usually are mobile, operating from vehicles. In any operation, there are many persons who must visit command posts frequently (fig. 4). To insure prompt movement both into and out of command posts, and to assist visitors in finding the staff sections they desire, some standard interior arrangements are necessary. Such arrangements may consist of—

- a. Locating the message center near the entrance to the command post.

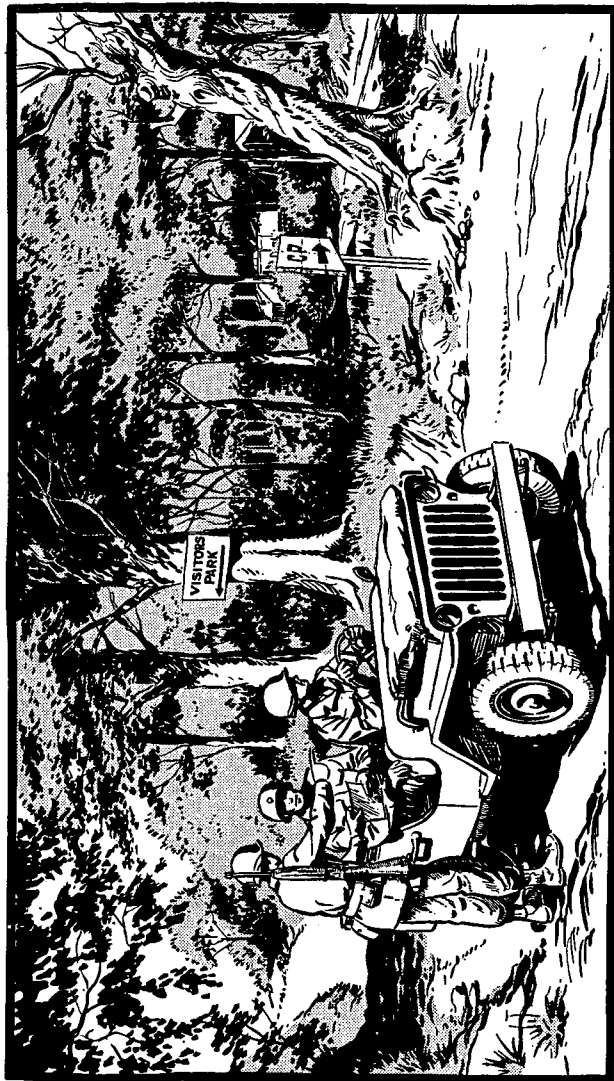


Figure 4. At the entrance to the command post there should be an alert, intelligent guide with a diagram of the locations of the staff sections.

b. Centrally locating the reporting offices of the commander, chief of staff or executive officer, and liaison officers in close proximity to each other.

c. Locating the operations and intelligence sections near each other.

d. Grouping the personnel and supply sections near each other.

27. MOVEMENT OF THE COMMAND POST. a. Orderly and efficient movement of the command post is insured by adequate planning. When the command post displaces, a prior reconnaissance of the new location is made by the adjutant or headquarters commandant. The general location for the new command post is prescribed by the commander, the exact location being determined by the signal or communication officer and the adjutant or headquarters commandant. Prior to the arrival of the command post column, and in sufficient time to allow for designating and marking locations of elements of the command post, an advance party composed of representatives from each staff section and from headquarters company (or headquarters and service company) joins the adjutant or headquarters commandant. This advance party marks the location of the respective activities and assists in guiding them promptly into their new location.

b. Command posts must be kept well forward in order to control the movements of the combat elements. Frequent moves are necessary not only for control but also for security. A command post that is allowed to remain in place while combat

elements move on loses its protection, and the commander either must attach combat units to it or run the risk of having its position compromised by enemy action. As the armored division has a complete system of radio communication, these frequent changes in positions do not disrupt communication.

c. The necessity for frequent changes in the command post location dictates that the armored division be equipped with command post vehicles which have radios, map boards, interior lights, and provisions for blackout, in order to maintain operation while on the move. Command post vehicles must be available at the battalion, combat command, and division headquarters in sufficient numbers to insure efficient operation of each headquarters.

d. Command post vehicles are necessary to the armored division not only for operation while en route but also when the command post halts. It is inconsistent with the primary role of the armored division to have command posts so organized that extensive preparations are essential to insure their efficient operation at any location.

e. The moving command post presents problems that are not normal to fixed command post operations. The ability to continue efficient functioning while en route requires adequate mobile equipment, forethought, and proper planning. Many of the aids present in the fixed installation are not available in a moving situation; among these are telephones, foot messengers, and personal liaison.

f. Radio, mounted messengers, and visual signals are the usual means of communication while on the move. No unusual problem exists in operating radios en route, but mounted messengers may experience great difficulties in passing columns to deliver messages to the addressee. Liaison planes may be used to drop messages.

g. Plans must be prepared for including in the command post vehicle the necessary personnel for efficient operation. In large command posts, voice radio is necessary for interior command post communication while en route. Staff officers must be able to transmit and receive voice radio messages and to conduct operations during movement.

h. It is essential that the command post column move in a fixed formation to facilitate the departure from the old location, the delivery of messages en route, and the reestablishment of the command post on arrival at the new location. All key vehicles must be marked plainly with appropriate section designations.

28. AXIS OF SIGNAL COMMUNICATION. As troops advance, command posts follow. The probable successive locations of any command post determine an axis of communication. This term is applicable to all commands. Although command posts of small units, such as platoons and companies, move more frequently than those of larger units, it still is true that the probable future locations of the command post of any unit form its axis of signal communication. In planning an axis of communication, command post locations should

be selected with care and with a view to movement within a reasonable time. Timely movement of a command post is essential, but unnecessary moves place an unnecessary burden on both the staff and the communication personnel, and leads to confusion and loss of control during the move. For this reason, the signal or communication officer must be informed of the general zone or routes of proposed advance in sufficient time to allow him to make recommendations for the location of command posts.

29. SIGNAL ORDERS AND ANNEXES. a. Paragraph 5 of the commander's operation order is devoted exclusively to details affecting signal activities of the command. It is based on the plan of signal communication submitted to the commander by the signal or communication officer. As a minimum, this paragraph indicates—

- (1) Initial location of the command post.
- (2) Index to the current signal operation instructions, and to the signal annex, if issued.
- (3) Restrictions, if any, on the use of radio.
- (4) Special visual signals.
- (5) Axis of signal communication.

b. A signal annex, when issued, amplifies the instructions and other information contained in paragraph 5 of the operation order.

c. For examples of division operation orders, see FM 24-16 and FM 101-5.

30. SIGNAL OPERATION INSTRUCTIONS (SOI) AND STANDING SIGNAL INSTRUCTIONS (SSI). a. Signal operation instructions are a type of combat order issued for the technical control and coordination of signal and communication agencies of a command. The signal operation instructions for all units of the armored division are prepared by the division signal officer. They conform to the SOI of the next higher command. Units smaller than the division have little occasion to prepare their own SOI, as they need to use only pertinent parts of the division SOI.

b. In some commands, it may be found desirable to issue these instructions in two complementary publications entitled, respectively, *Signal Operation Instructions (SOI)* and *Standing Signal Instructions (SSI)*. In such cases, the SOI generally include only that operational data which are subject to frequent change, while the SSI contain items of operational data not subject to change, and instructions for use of the SOI.

31. STANDING OPERATING PROCEDURE (SOP). The standing operating procedure for any military unit is a set of uniform standardized procedures and techniques established by the commander as a guide for the performance of all contemplated operations that can be standardized. The division signal SOP is prepared by the division signal officer and submitted to the G-3 for approval. The communication SOP for any of the other units in the division is prepared by the proper communication officer for approval by his unit commander. It must conform to the division SOP.

32. RADIO NETS—GENERAL. A radio net consists of two or more stations operating together on the same frequency. A radio net is organized only for the purpose of exchanging messages between stations in the net. Thus, a radio net provides a commander with a means by which he directs the actions of the troops under his command and reports the results of such actions to the next higher command. Radio nets of armored units vary in size from two or three stations to 30 or more stations per net. Radio nets are organized in accordance with the type of equipment, the tactical organization and requirements, and the purpose for which they are intended. The normal composition of each net is prescribed by the signal operation instructions, but the nets frequently are varied as required by the tactical situation.

33. CONTROL OF RADIO NETS. In order to have centralized control and maintain discipline in a radio net, a net control station (usually called NCS) is required. This NCS has full authority in matters of technical control of radio stations in its net. The NCS usually is the station of the highest headquarters represented in the net. Other stations in the net are called subordinate stations. It is not uncommon for one station to be the net control station of one net and at the same time be a secondary station in another net. Strict radio net discipline is essential for efficient communication in any radio net.

34. TYPES OF RADIO NETS. Radio nets may be classified in accordance with the mode of trans-

mission of the radio sets used therein, the purpose for which the nets are intended, or the frequency on which the nets operate. Classified by purpose for which intended, the radio nets used within armored units include command nets, administrative nets, fire-direction nets, reconnaissance nets, and liaison nets. These classifications indicate the primary purpose of the net. In certain units, such as division headquarters and combat command headquarters, parallel radio nets are established, with each being used for a single purpose. In the battalion, a command net is established between the battalion headquarters and its companies. This net is used primarily for command but must be available also for other purposes, such as administration and intelligence. In addition, any radio net may be converted to a special-purpose net to fit a particular situation. One type of special-purpose net is a warning net, which is used to provide a rapid means of alerting the unit in case of security threats, or as an alternate means of communication in the event wire or other means fail. For instance, a tank battalion in bivouac often may close all radio nets except the battalion command net. In this case, the battalion command net becomes a warning net and usually contains radio stations from each company and from security outposts.

a. A command net is the principal net by means of which a commander directs the actions of the units under his command. Command nets, whether radiotelephone, radiotelegraph, or both, are used by platoons, companies, battalions, combat commands and comparable units, and the division.

b. The purpose of an administrative net is to provide a means for transmitting administrative or logistical messages, thereby reducing the traffic over the command nets to that which primarily is tactical.

c. A fire-direction net is the principal net over which artillery and mortar fires are directed and controlled.

d. A reconnaissance net is organized for the purpose of exchanging, between the forward elements and the division headquarters and other units of command, information relative to enemy forces and actions.

e. A liaison net is organized for the purpose of exchanging information between adjacent commands.

35. COMMUNICATION TRAINING OF PERSONNEL.

The effectiveness of a unit's signal communication system usually can be measured by the standard of communication training of its personnel. Communication training of all personnel is a command responsibility. This training must be continuous and planned carefully. All communication training must be planned and conducted so that it will develop teamwork. The merging of individual and specialist training to secure teamwork in the working unit constitutes section training. The training of various sections is conducted simultaneously and is accomplished by the full utilization of officers and noncommissioned officers in charge of sections or platoons. Teamwork within sections is perfected during the combined training of the

unit. Concurrent training must not be overlooked. For example, if a tank platoon is on the firing range or receiving driving instruction, full use should be made of the tank radio set and the inter-phone system. Likewise, whenever a staff section goes into the field in a command vehicle for the purpose of training the section, normal radio, wire, and messenger personnel must be included so that full value of the training may be derived by the entire section working together as a team.

Section II. MEANS OF SIGNAL COMMUNICATION

36. GENERAL. Communication is an indispensable part of every military unit. It serves as the nerve system for the control of the organization. Regardless of its size, mission, or location, a unit cannot operate without communication. Not only must a commander have communication within his own unit, but also must have communication with higher, subordinate, adjacent, and supported or supporting units. There are *five means* of communication available for use by armored units in order to meet the above requirements: *radio, messenger, wire, visual, and sound*. For armored units, communication must fulfill the following basic requirements:

a. Command. A commander always must have control of his unit. Whenever possible, he exercises this control by direct personal contact with subordinate commanders. When personal contact is not possible, he must be able to control his sub-

ordinate units by one or more of the five means of communication listed above.

b. Information, liaison, and administration. Communication channels must provide for the exchanging, reporting, and disseminating of information and intelligence within and between units. Units must be able to handle adequately administrative traffic pertaining to such matters as supply, personnel, and control of a headquarters.

c Fire control. Communication channels must be provided for requesting and adjusting fire. Fire commands must be transmitted to firing units.

37. RADIO COMMUNICATION—GENERAL. Radio is the principal means of communication in armored units. It is used for tactical control, fire control, exchange of information, administrative purposes, and liaison between and within units. Because of its flexibility, radio is used between rapidly moving units where the use of wire or other means of communication is difficult, over extended areas where wire or other means are impracticable, and between air and ground. Radio is adapted especially to rapidly moving situations and, at times, may be the only means of communication available. Radio has only one distinct advantage over other types of signal communication: the relatively high degree of mobility of the system resulting from the fact that no physical circuits are necessary between stations. There are, however certain important limitations of radio communication. For example, radio offers the

enemy a volume of messages for study, possibly resulting in an eventual break-down of the code or cipher used. Radio is susceptible to interference from atmospherics, from enemy communication and jamming stations, and from friendly stations. In many cases, the range of radio communication is affected by the nature of the terrain. Moreover, through the enemy position-finding equipment, radio discloses the approximate number, types, and locations of operating radio transmitters. It therefore follows that although radio is the principal means of communication in armored units, it cannot be used to the exclusion of the other means available. Consequently, each means of communication must be supplemented by all other means available.

38. CLASSIFICATION OF RADIO SETS. A radio set may be classified in accordance with any one or all of the following:

- a. Mode of transmission, including type of modulation.
- b. Power.
- c. Frequency covered.
- d. Type of installation (fixed, portable, pack, vehicular, etc.).

39. TYPES OF RADIO SETS. a. Military radio sets are of the following general types:

- (1) *Airborne*—a set installed and operated in an aircraft.
- (2) *Air-transportable*—a set especially designed to be transportable by air, accord-

ing to specifications or military characteristics.

- (3) *Ground, fixed*—a large set erected and operated at a permanent location, usually for long-distance communication.
- (4) *Ground, mobile*—a set installed as an operating unit in a motor vehicle which has no function other than transporting the radio equipment.
- (5) *Ground vehicular*—a set installed in a vehicle which is designed for functions other than carrying radio equipment, such as a set installed in a tank.
- (6) *Ground, transportable*—a set which is semiportable: capable of being transported from place to place, but requiring a conveyance if moved for any considerable distance.
- (7) *Ground, pack or portable*—a set which can be carried by a man and operated, while stationary or in motion, by one person.
- (8) *Ground, general ground use*—a set which can be installed and operated for two or more types of ground use; that is, a set which can be used both as a vehicular ground set and as a transportable ground set, or one which can be used both as a vehicular set and as a portable pack set.
- (9) *Shipboard*—a set installed and operated aboard a surface vessel.
- (10) *General utility*—a set which can be used in two or more of the general type

installations: airborne, shipboard, and ground.

b. The radio sets generally indicated in this manual are those currently in use. For a discussion of the family of 30 radio sets planned for issuance in the near future, see appendix III.

40. NETTING OF RADIO SETS. In order for one radio to be netted with another, both must be capable of operating on a common frequency, and both must be capable of providing the same type of emission. Frequency coverage of currently authorized radio sets is shown in appendix II.

41. RADIO MAINTENANCE—GENERAL. Reliable operation of radio equipment is obtained through proper care and use. Radio maintenance performed by divisional units (fig. 5) consists of organizational maintenance performed by the user and unit repairman, and field maintenance performed by the radio repairmen of the armored signal company. Many maintenance functions are performed in a definite category, but others may be performed in either of two or more categories. The following rules are used to determine the category in which a specific task is performed.

a. Maintenance is performed in the lowest category where the work can be done, consistent with capabilities of tools and test equipment, ability of personnel, availability of replacement parts, time, and the tactical situation.

b. Maintenance normally performed by a higher category will not be performed by a lower category if it will hinder normal operations.

F I E L D M A I N T E N A N C E	O R G A N I Z A T I O N A L M A I N T E N A N C E	Operate set in prescribed manner. Clean exterior of set. Check antenna sections, mast base, and lead-in. Check ground connection. Check spare fuses. Check serviceability of head phones, microphones, and key. Check operation of tuning controls. Report trouble or damage to any part of set or unsatisfactory operation to company repairman. Check set mounting in vehicle. Check for satisfactory operation of set. Check vehicle and set batteries.
		Replace tubes (by complete sets). Replace batteries. Replace fuses. Tighten loose parts on exterior of set, mounting, or antenna. Tune FM sets to prescribed channels.
		Test tubes and maintain complete sets of serviceable tubes. Repair or replace cordage. Periodic preventive maintenance check. Clean, tighten, and lubricate interior of set (except lubrication of dynamotor). Minor modifications of sets as called for by MWO SIGs. Solder loose wires and connections.
		Check faulty sets to locate trouble. Clean dynamotors and change brushes. Replace faulty fixed elements of set, including resistors, capacitors, chokes, transformers, jacks, and switches. Repair relays and switches.
		Major modifications of sets as called for by MWO SIGs. Dynamotor maintenance to include lubrication. Recalibration of tuning elements. Alignment of set, to include I-F stages. Repair or replace any defective part of set. Technical supervision of organizational repairmen. Periodic field maintenance check.

Organizational Maintenance: Performed by user and unit radio repairman.

Field Maintenance: Performed by signal company repairman.

Figure 5. Radio maintenance within the armored division.

c. Operations of each category embrace those of all lower categories.

d. Spare equipment is used for replacement when time is not available for repairs.

e. The nearest facility capable of performing the required maintenance operation is utilized.

42. SUPERVISION OF RADIO MAINTENANCE. a. Supervision of radio maintenance requires both technical control and command inspection. Technical supervision operates through all categories. Organizational maintenance performed by the operator or vehicle commander is checked by the company radio repairman. Organizational maintenance performed by the company repairman is checked by the battalion repairman during frequent spot checks and periodic complete checks. Within a division, the division signal officer may form inspection teams from the radio repair personnel of the signal company for the purpose of inspecting signal equipment.

b. The unit communication officer must devote considerable time to personal inspection and supervision of radio maintenance work within the unit. He is assisted by the communication chief, who may perform some maintenance work when necessary. The communication officer insures that—

- (1) Radio repairmen are trained adequately and kept up to date on modifications, new equipment, and changes to installation and maintenance procedure.
- (2) Maintenance is performed correctly.

- (3) Shops and other working spaces are kept clean and orderly, and tools and equipment are kept and used properly.
- (4) Adequate records of equipment, spare parts, and replacement items are maintained.
- (5) Periodic preventive maintenance is performed and recorded properly.
- (6) The unit commander is kept advised of the status of signal equipment within the unit.
- (7) Tools and spare parts are requisitioned as required and the requisitions are followed up.

c. The unit commander insures adequate maintenance of communication equipment by—

- (1) Requiring the communication officer, noncommissioned officers, and repair personnel to spend sufficient time to insure adequate maintenance.
- (2) Providing adequate working facilities.
- (3) Command inspections of equipment, to include—
 - (a) Demonstration of satisfactory operation.
 - (b) Serviceability and cleanliness of equipment.
 - (c) Presence of all spare parts.
 - (d) Proper installation.
- (4) Disciplinary action to correct abuse or loss of equipment.

43. PREVENTIVE MAINTENANCE. Preventive maintenance is performed by all personnel responsible for communication equipment. Careful operation, prompt reporting of any trouble, and thorough cleaning and tightening of all parts by the user are major steps in keeping sets in operation. Preventive maintenance is performed before and after each operation of the equipment, and at such other times as may be necessary to insure adequate care.

44. RADIO MAINTENANCE RECORDS. a. Each company and battalion repairman maintains a record of all radio sets within his unit, and schedules necessary periodic preventive maintenance checks. Spare sets issued to units are installed to replace those removed from vehicles for maintenance checks. Periodic preventive maintenance checks normally are performed on each radio set at 2-week intervals. This period may be varied when necessary, depending upon use of the equipment. Two to 4 hours should be allotted for each check.

b. Check sheets may be prepared by communication officers to insure adequate coverage at each inspection. Deficiencies noted are repaired as soon as possible, and noted on the radio set record.

c. Replacement parts and replacements for defective items of radio equipment are requisitioned in accordance with existing regulations. When any particular item is found to give recurrent trouble, or appears to fail due to faulty manufacture, it should be reported on a defective equipment form (fig. 6). A supply of replacement parts authorized by tables of equipment and current signal catalog

should be maintained by using units; this stock should be kept to the minimum consistent with the proper maintenance of equipment. Spare parts must be protected adequately against damage or loss.

DEFECTIVE	
TYPE <u>BC-620</u>	SER NO. <u>61375</u>
O SYMPTOMS <u>INTERMITTENT OPERATION</u>	
	<u>FAULTY SWITCHES - FUNGUS</u>
DATE <u>6 AUG 47</u>	SIG <u>James A. King</u>
(OVER)	Operator

HOW DID DAMAGE OCCUR?	
O <u>THROUGH CONTINUOUS USE</u>	
DATE <u>6 AUG 47</u>	<u>William E. Zetty</u>
(OVER)	Officer Or NCO In Charge <u>Capt. Chris O</u>

Figure 6. Sample form to be executed and attached to defective equipment to be repaired.

INSPECTION CHECK LIST FOR SIGNAL COMMUNICATION INSPECTING TEAMS

ORGANIZATION _____

ADJECTIVAL RATING _____

DATE _____

NUMERICAL RATING _____

INSTRUCTIONS: 1. The signal communication inspection check list is divided into three sections: radio, wire, and miscellaneous equipment. Under each major item in each section is a list of deficiencies. Each item has a total value of 100 per cent. The number after each deficiency is the value to be subtracted from 100 if such deficiency exists. To compute the over-all adjectival rating, find the average numerical rating of three sections and consult the table below.

Numerical rating

0 — 69

70 — 79

80 — 84

87 — 93

94 — 100

Adjectival

Unsatisfactory

Satisfactory

Very Satisfactory

Excellent

Superior

2. Under Remarks include any additional information which may explain the rating given. Also include information as pertains to the location or status of the equipment.

3. If more than one item of the same type is inspected, the average numerical rating will be $\frac{\text{number of items} \times 100 - \text{total value of deficiency}}{\text{Number of items}}$

Number of items

SECTION I RADIO EQUIPMENT

TYPE RADIO _____

NUMERICAL RATING _____

SERIAL NO. _____

DATE _____

OPERATOR _____

ORGANIZATION _____

VEHICLE NO. (if mounted) _____

1. Transmitter	Value	Def	2. Receiver	Value	Def
Not operating	31		Not operating	31	
Improper voltages	10		Improper voltages	9	
Noisy dynamotor	10		Noisy dynamotor	10	
Push buttons tight	5		Push buttons tight	5	
Switches broken	8		Switches broken	8	
Loose connections	7		Loose connections	7	
Cords, broken, frayed	6		Cords, broken, frayed	6	
Fuse, incorrect size	4		Fuse, incorrect size	4	
Microphone or key	5		Headset or loudspeaker	5	
Pilot lamp, out	3		Pilot lamp, out	2	
Covers, missing	3		Squelch circuit faulty	5	
Rusty	5		Rusty	5	
Dirty	3		Dirty	3	
Total Deficiencies			Total Deficiencies		
Numerical Rating			Numerical Rating		

Figure 7. Sample form used by inspecting team; sections II and III are similar to section I.

3. Antenna	Value	Def	4. Interphone	Value	Def
Incorrect length	20		Not operating	35	
Lead in disconnected	30		Switch box, faulty	20	
Insulator missing on rope	20		Loose connections	25	
Rusty junctions	20		Cords, broken, frayed	10	
Junctions not locked or taped	10		Dirty	10	
Total Deficiencies			Total Deficiencies		
Numerical Rating			Numerical Rating		

5. Remote Control Unit	Value	Def	6. Power Unit	Value	Def
Not operating	35		Bad vibrator	30	
Defective switches	10		Cords, broken, frayed	20	
Stored w/batteries	31		Fuse, (spare) missing	20	
Loose connections	9		Rusty links	20	
Volume control faulty	10		Dirty	10	
Dirty	5				
Total Deficiencies			Total Deficiencies		
Numerical Rating			Numerical Rating		

Remarks:

Figure 7. Sample form used by inspecting team; sections II and III are similar to section I—Continued.

d. For a sample form to be executed by personnel making signal equipment inspections, see figure 7.

45. WIRE COMMUNICATION—GENERAL. Wire communication normally is used to supplement radio communication systems of armored units. Wire communication requires the construction of physical circuits, which consumes considerable time and material; yet, the desirability of using wire under certain conditions cannot be overlooked. There are conditions under which wire may become the principal means of communication within an armored unit. Wire, supplemented by other means, nearly always is used within the rear echelon, and frequently is used within the forward combat units. Wire telephone is used almost exclusively between the artillery battery executive officer and the guns of his battery. The over-all security of wire communication is greater than that of radio. It must be borne in mind that wire communication under certain conditions is not only desirable but necessary—particularly in a stable situation. Wire should supplement radio and other means of communication whenever possible. Short, temporary wire lines can be laid quickly in forward areas if personnel and equipment are available, if enemy activity is not too pronounced, and if terrain is suitable. A reasonable proficiency in wire communication does not require the degree of training that is demanded by radio—particularly radio-telegraph.

46. WIRE-LAYING EQUIPMENT. Field wire may be laid from reel units mounted in motor vehicles, from reels on axles carried by hand, from bundles or coils carried by hand, from coils carried by aircraft, and from coils by use of rockets. For information on currently authorized wire equipment, see appendix IV.

47. FIELD TELEPHONES. One advantage of the telephone is that it provides personal voice contact between individuals. Its disadvantages are the lack of a record of the conversation and the fact that it encourages too much talk. The distance over which satisfactory telephone communication is possible is determined by the electrical characteristics of the telephone circuit. The efficiency of the telephone system depends upon a number of factors, the most important of which are the type of wire line construction, type of equipment used, weather conditions, and state of training of the personnel operating and using the system. Field telephones are used by every unit in the armored division. They are used not only to provide communication but also to check field wire systems. There are two general types of field telephones used by armored units: battery-operated and sound-powered.

48. TELEPHONE SWITCHBOARDS. The purpose of a switchboard is to provide flexibility in a wire system by providing intercommunication between telephones and providing connections to trunk circuits leading to other units. In armored units, 6-drop and 12-drop switchboards generally are

used in all units at battalion level. Small portable patching switchboards are used at company level. More elaborate switchboards of the telephone central office type are used above battalion level. For further information concerning currently authorized switchboards, see appendix IV.

49. MESSENGER COMMUNICATION—GENERAL. Messenger communication is needed and used by all units of the armored division, from the smallest to the largest. Of all the methods of signal communication, messenger communication is the most dependent upon personnel and the least dependent upon equipment. All persons in the military service are directed to assist messengers carrying important messages, by pointing out the route, giving directions, and providing transportation, if necessary.

50. MESSENGER PERSONNEL—GENERAL. a. The operation of messenger communication is a function of the communication center or message center, and personnel are assigned to these agencies for such duty. The commander may, if the situation demands, attach additional personnel from other than signal or communication agencies to the communication center or message center to meet enlarged messenger communication requirements. The term *messenger*, as used in this manual, refers to personnel designated to carry messages. Messengers are further designated as follows:

- (1) Messengers employing no means of transportation are called dismounted messengers.

- (2) Messengers employing motor, bicycle, motorcycle, or airplane, are called mounted messengers.
- (3) In some situations, a type of special messenger, termed an *agent*, is employed by the commander as a personal representative for liaison duty with another unit.

b. In some instances, it may be desirable to utilize commissioned officers to carry messages and documents. In most of these cases, the material they carry will be of a classified nature. Officers so designated to carry messages are called *couriers*.

51. EMPLOYMENT OF MESSENGERS. The decision to use messenger communication, rather than some other available means, for the transmission of a message is made by the message center. In general, messenger communication will be used for the transmission of messages of the following types:

- a. Messages to be sent only a short distance, exclusive of strictly local messages.
- b. Messages of excessive length, and routine administrative reports.
- c. Maps, documents, photographs, and similar messages when facsimile transmission is impracticable or is not available.

52. EMPLOYMENT OF SCHEDULED MESSENGERS. In field organizations, scheduled messenger communication normally will be established. Such communication is continued except in extremely mobile situations, where it may be impossible. Scheduled

messengers deliver to communication centers or message centers and not to individuals.

53. EMPLOYMENT OF SPECIAL MESSENGERS. Messengers should be available for the immediate dispatch of messages when scheduled service has not been established or when the urgency of the message requires that it be sent at once.

54. EMPLOYMENT OF DROP AND PICK-UP MESSAGES. Drop and pick-up message procedures are used as an emergency method of communication between air observers and forward ground units. They are used also as methods of communication between ground units in special situations. Field units down to battalion or company size should be familiar with the general nature of drop and pick-up message procedures.

55. VISUAL COMMUNICATION. a. General. Visual communication includes all signals received by the eye, regardless of how they are transmitted. Visual communication, as used in armored units, includes arm and hand signals, flags, pyrotechnics, smoke, and panels.

b. Use of visual communication. Visual communication is used within armored units as an auxiliary means supplementing radio and wire, and the necessary equipment issued for its use always should be at hand and in operating condition. It may be used to supplement one-way radio communication. For example, where a forward unit is able to receive messages by radio but not to trans-

mit, it might be directed to send a reply by means of visual communication—with panels, flags, flares, or smoke. The use of visual communication depends upon the type of equipment available, the proximity of the enemy, the terrain, and the weather. There must be mutual visibility between stations in order to use visual means of communication.

56. SOUND COMMUNICATION. **a. General.** The transmission of messages by audible sounds produced by mechanical or acoustical devices, excluding speech, and their direct reception by ear, constitute sound communication. Such common sound-producing devices as whistles, horns, sirens, and bugles, and the sounds produced by small arms, artillery, and engines, frequently are used for signaling.

b. Use of sound communication. The chief value of communication by sound is the resulting economy in time, personnel, and equipment when sound is utilized for giving alarms, for attracting attention, or for the transmission of short prearranged messages over short distances.

Section III. RETROGRADE MOVEMENTS BY ARMORED UNITS

57. GENERAL. Situations may arise when the armored division, or an element of the division, will have to give up ground that it has gained and move to the rear. Such a movement is called a *retrograde movement*. When a retrograde movement is to be executed, units in contact with the enemy designate

portions of their own forces to remain in position and cover the major part of the unit which is executing the retrograde movement. During a retrograde movement, signal and communication officers must foresee the possibility of being required to provide additional signal equipment, especially radio-equipped vehicles, for commanders of covering forces.

58. COMMUNICATION DURING RETROGRADE MOVEMENTS.

Radio will remain the principal means of communication during this type of action. A minimum amount of wire will be used. Command posts and supply, maintenance, and medical installations normally will be located farther to the rear than they are when the unit is in the attack. Special attention should be given to the selection of sites for radio sets to insure maximum transmission range. If additional radio-equipped vehicles are required for covering force commanders, these radios will, in most cases, have to be diverted from their primary mission. Covering force commanders maintain contact with elements of the covering force and with the next higher headquarters.

Section IV. SPECIAL OPERATIONS BY ARMORED UNITS

59. GENERAL. The armored division is provided with sufficient organic signal communication personnel and equipment to provide adequate communication during almost any type of operation. For special operations, such as in deserts, moun-

tains, jungles, or arctic regions, special additional support may be required from higher headquarters.

60. PLANNING FOR COMMUNICATION DURING SPECIAL OPERATIONS.

a. Desert operations. In desert warfare, lines of communication are extended, little cover is available, and supply and maintenance problems are increased greatly. Speed and mobility, which characterize effective desert operations, make the use of wire communication impracticable except in defensive situations. Use of additional radios may be advisable to improve control, and the time necessary to obtain extra communication equipment must be considered in planning operations. Extreme temperature changes, dust, and humidity conditions peculiar to the desert require intensified user maintenance.

b. Mountain operations. In mountain operations, careful communication estimates and plans are made necessary by the difficult terrain and the danger of landslides, severe storms, and deep snows. Wire communication assumes increased importance in mountainous terrain because radios are affected by masking peaks and crags. Wire lines must be protected, however, from storm and landslide damage. The use of carefully sited radio sets as relay stations will aid communication. Visual signaling will assume increased importance in the mountains.

c. Jungle operations. Jungle operations are characterized by the widespread effect of heavy moisture and malignant fungi on communication equipment. Communication equipment must be

moistureproofed and fungiproofed, and user maintenance must be intensified. Jungle terrain may reduce the operating range of radio equipment by from 40 to 70 percent below the range of the equipment in temperate zones. Wire communication assumes greater importance in the jungle. Whenever possible, wire should be strung overhead. One method that may be employed is to utilize liaison planes to lay wire over the tops of trees.

d. Arctic operations. The extreme cold and heavy snow found in the arctic reduce the operating efficiency of personnel and equipment to a marked degree. In arctic temperatures, the electrical characteristics of communication equipment are affected to such an extent as to require special precaution and preventive maintenance measures involving extensive use of heating devices and protection from cold.

e. Amphibious operations. Special amphibious training should be given to communication personnel. This is necessary to train personnel in the special waterproofing and equipment maintenance measures demanded by amphibious operations. All sets must be pretuned prior to loading aboard ship. The unusual control conditions of amphibious operations require extra communication equipment, as well as the careful allocation of communication personnel to permit maximum communication support. Communication afloat normally will be provided by the Navy.

CHAPTER 2

THE ARMORED SIGNAL COMPANY

Section I. GENERAL

61 MISSIONS. The principal missions of the armored signal company are to—

a. Install, maintain, and operate the division signal communication system at the echelons of division headquarters, and at such other locations as may be required to insure proper control.

b. Install and maintain portions of the division signal system to or at subordinate divisional and attached units.

c. Maintain a division signal supply and salvage service for divisional and attached units.

d. Perform field maintenance on signal equipment for divisional and attached units, and to supervise, through inspections, organizational maintenance of subordinate units.

e. Provide limited photographic services for the division and attached units.

f. Provide security of communication through such monitoring and supervision as the signal officer may prescribe.

62. ARMORED SIGNAL COMPANY STANDING OPERATING PROCEDURE. The SOP for the armored

signal company is an amplification of the division signal SOP. It sets forth the organization of the company for tactical purposes and prescribes procedure for the various platoons and sections of the company. It is concerned mainly with the installations and employment of the signal communication agencies and services which the signal company provides for the division. Parts of the SOP will prescribe the manner in which the elements of the company operate under certain conditions. It may be supplemented by radio net, circuit, and traffic diagrams, if desired. The amount of detailed instructions in the SOP will depend on the desires of the signal officer, the status of training in the unit, and the equipment available. The signal SOP for the armored division is written by the division signal officer and is used as a guide in preparing the company SOP. For a thorough discussion of the SOP, see FM 24-16. The armored signal company commander will consider the following items when writing his SOP:

- a. Scope of SOP and references.
- b. Mission of the company.
- c. Disposition of the company.
- d. Movement of the company.
- e. Operations.

(1) Communication center operations.

(a) Message centers.

(b) Mounted and local messengers.

(c) Cryptography and cryptographic security.

(2) Radio nets and radio operations (except radio relay).

- (3) Facsimile equipment.
- (4) Photographic service.
- (5) Wire communication.
 - (a) Construction.
 - (b) Recovery procedure.
 - (c) Telephone and teletype operation.
 - (d) Radio relay operation.
- f. Radio repair and maintenance.
- g. Radar maintenance.
- h. Supply (division signal and company).
- i. Signal security.
- j. Motor maintenance.
- k. Administrative details.

Section II. ORGANIZATION, ARMORED SIGNAL COMPANY

63. GENERAL. The armored signal company is organized under T/O&E 11-57N. The company (fig. 8) includes a company headquarters; a division signal officer's section; a division signal supply, photo, and maintenance section; a radio platoon; an operations platoon; and a construction platoon. For field operations, most of the platoons and sections are divided into working teams which vary in different units. The division signal officer exercises operational control of the armored signal company.

64. DIVISION SIGNAL OFFICER'S SECTION. This section is composed of the division signal officer, the assistant division signal officer, and enlisted personnel.

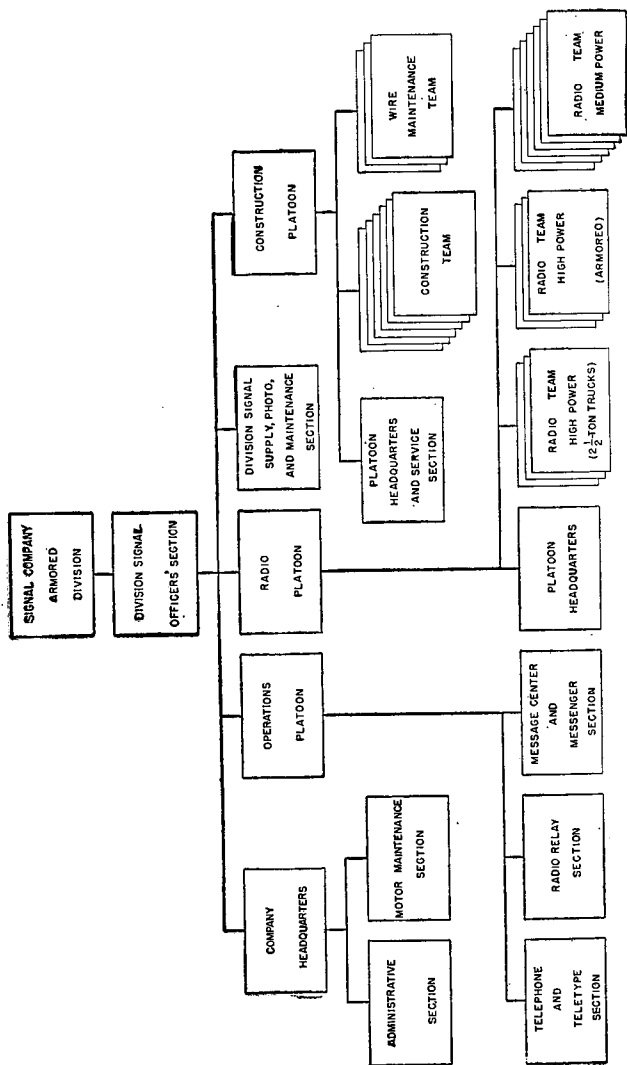


Figure 8. Organizational chart, armored signal company.

a. The division signal officer is a member of the division commander's special staff. He is the adviser to the commander and staff members on matters of signal communication and location of command posts. For other duties of this officer, see paragraph 5.

b. The assistant division signal officer performs such duties as are directed by the signal officer. In the absence of the signal officer, the assistant division signal officer assumes his duties.

65. COMPANY HEADQUARTERS, ARMORED SIGNAL COMPANY. The company headquarters includes the company administrative section and motor maintenance section. The motor maintenance section performs organizational repair and maintenance of organic company vehicles.

66. RADIO PLATOON, ARMORED SIGNAL COMPANY. The radio platoon consists of a platoon headquarters and six high-power and six medium-power mobile radio teams. The teams provide radio communication between division and higher headquarters, between echelons of the division headquarters, and between division headquarters and certain subordinate units in the division and units under division control. The platoon also provides radio teams to furnish communication for such special missions as may be required.

67. OPERATIONS PLATOON, ARMORED SIGNAL COMPANY. a. **General.** The operations platoon consists of the message center and messenger section,

the telephone and teletype section, and the radio relay section. These sections provide the personnel and equipment necessary for the operation of communication centers and telephone and radio relay installations at echelons of division headquarters, at locations prescribed by the division signal officer.

b. Message center and messenger section. This section consists of the personnel and equipment necessary to provide the message center facilities of the communication center (comcenter). Warrant officers are assigned to the section to serve as cryptographic officers and may be assigned as officers in charge of comcenters. The personnel of the message center provide cryptographic service, messengers, and the necessary personnel to process messages. For a full description of message center functions, services, and procedures, see FM 24-17.

c. Telephone and teletype section. This section installs, operates, and maintains telephone switchboards, teletypewriters, and teletypewriter switchboards used at all echelons of division headquarters. This section also installs and maintains all telephones at echelons of division headquarters, and installs, operates, and maintains the teletypewriters used by the combat and reserve commands.

d. Radio relay section. Radio relay personnel are organized into teams to provide voice and teletype radio relay channels (fig. 9), normally between division headquarters and the combat and reserve commands, and such other channels as may be required.

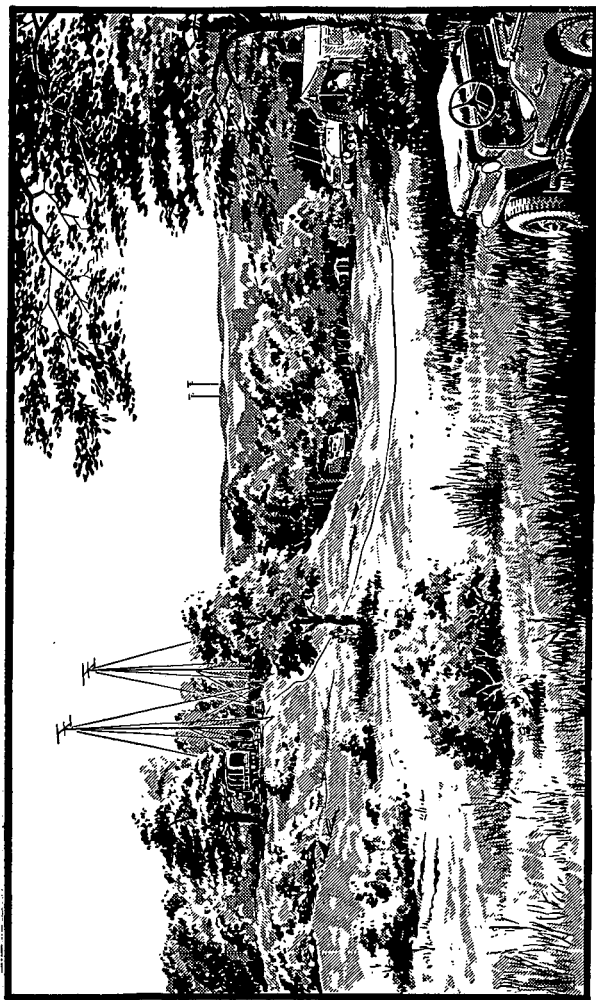


Figure 9. Radio relay terminal installation.

68. CONSTRUCTION PLATOON, ARMORED SIGNAL COMPANY. **a. General.** The construction platoon consists of a platoon headquarters and service section, construction teams, and wire maintenance teams. The mission of this platoon is to construct and maintain wire lines from echelons of division headquarters to and within major subordinate commands and certain other units, as prescribed by the division signal officer.

b. Platoon headquarters and service section. This section includes the field line construction officer, who is the platoon leader; the field lineman chief; the assistant field lineman chief; and the service section. The service section is charged with picking up wire and servicing recovered wire and with carrying the supplies of wire and equipment needed by the section. The personnel may be used to supplement construction teams when needed.

c. Construction teams. The principal duty of these teams is to construct telephone trunk lines and long locals. To carry out their mission, these teams are attached to echelons of division headquarters and to various units of the division.

d. Wire maintenance teams. The wire maintenance teams are used primarily for trouble shooting in order to maintain the wire system installed by the construction teams. These teams also may be used to construct short trunk and local lines, and to install equipment used with these lines. These teams, normally located at division headquarters, work directly under the field lineman chief.

69. SIGNAL SUPPLY, PHOTO, AND MAINTENANCE SECTION, ARMORED SIGNAL COMPANY. a. General.

This section works under the direct supervision of the division signal officer.

b. Signal supply. The signal supply personnel supervise the procurement, storage, and issuance of all signal supplies and equipment required for the division and attached units. They keep stock record accounts of signal supplies of the division. They also are charged with the evacuation of captured enemy equipment, and the turn-in of equipment for repair by higher categories.

c. Photo. The photo personnel operate in teams to provide limited ground photographic coverage for the division through the use of still-picture and motion-picture equipment. Limited aerial photographic coverage also may be provided; however, airplanes are not organic to the section. The section can provide limited developing and printing of still photos. The division signal officer must control the teams directly to obtain proper coverages.

d. Signal maintenance. The maintenance personnel also operate in teams. They are equipped to perform organizational maintenance on all signal equipment of the armored signal company, and to perform field maintenance on all signal equipment in the division. To provide field repair and maintenance for the division, light and heavy radio repair teams are attached to units of the division as required. Included is one radar maintenance team to be used as directed by the division signal officer.

Section III. ORGANIZATION FOR COMBAT, ARMORED SIGNAL COMPANY

70. GENERAL. For operational purposes, the armored signal company is established in two or more echelons (usually two, forward and rear), with smaller groups of personnel and equipment attached to subordinate divisional units. Included in the signal company forward echelon will be the division signal officer's section, the comcenter team, wire construction and operational teams, and radio teams, as required. The rear echelon normally includes administrative, supply, repair, motor maintenance, and nonoperating personnel. While the problems of location, messing, supply, and maintenance will be met in various ways in each unit, the following paragraphs will provide a basis for planning by the signal company commander and platoon and section officers in accomplishing their mission.

71. ORGANIZATION FOR COMBAT, FORWARD ECHELON, ARMORED SIGNAL COMPANY. The forward echelon (command post) of the signal company normally is located so that the personnel installing, operating, and maintaining signal communication at or near the division headquarters forward echelon can be housed and messed in the signal company area. For this reason, the division signal officer or his representative, while making a reconnaissance of prospective division command post sites, usually will be accompanied by a representative of the signal company. When the site for

the division CP is selected, the signal company representative, on the advice of the signal officer, selects a site for the signal company. The forward echelon of the signal company normally moves with the forward echelon of division headquarters. The company headquarters, under the echelon arrangement, will be divided so that mess, supply, and motor maintenance teams are located at the forward echelon to provide for the signal personnel of that echelon.

72. ORGANIZATION FOR COMBAT, REAR ECHELON, ARMORED SIGNAL COMPANY. That portion of the company headquarters not located at the forward echelon will be located at the signal company rear echelon in the vicinity of the division headquarters rear echelon. Signal operating personnel of the division headquarters rear echelon will be housed and messed at the signal company rear echelon. The location of repair and service teams of the company will be determined by the division signal officer. (These teams will be considered under appropriate headings in this section.) Company administrative personnel normally will be located in the signal company rear echelon.

73. SIGNAL SUPPORT FOR THE DIVISION COMMAND GROUP. The use of a command group for command purposes is a common practice (see paragraph 25). This practice is particularly applicable when an armored division is operating in a rapidly moving situation. The signal personnel and equipment to accompany the command group usually

will be set forth in the division SOP. The selection of locations for the command group may be dictated by circumstances rather than made from the considered reconnaissance of several locations; whenever possible, locations should be selected which will make it possible to utilize existing communication facilities established for combat commands.

74. DIVISION COMMUNICATION CENTERS (COMCENTERS)—GENERAL. Message center teams are located at division headquarters forward and rear echelon communication centers. These teams are equipped and staffed to provide message center and cryptographic service at these echelons, and to provide scheduled and special messenger service between these comcenters, the command group, the subordinate units directly under division control. The comcenter operates to expedite the handling of message traffic through the division headquarters. The records kept at the comcenter must provide an accurate record of all material handled. For a description of the functions, services, and procedures of comcenters, see FM 24-17.

75. ORGANIZATION FOR COMBAT, DIVISION HEADQUARTERS FORWARD ECHELON COMCENTER. a. General. This team contains the bulk of the comcenter, messenger, and cryptographic personnel. It operates on a 24-hour basis by setting up a system of reliefs within the team. It arranges to provide personnel and equipment for the command group, as required.

b. Location. The forward echelon comcenter operates from organic team vehicles with additional tentage for clerks. Cryptographic and teletype machines usually are kept in vehicles, with administrative work being carried on in the tent. Whenever it is practicable to do so, the comcenter will be located in a building.

c. Personnel. The personnel of the forward echelon comcenter will include the officer in charge, the noncommissioned officer serving as comcenter chief, code clerks, comcenter clerks, messengers, and operating personnel for teletype and other communication equipment set up in the communication center.

76. EMPLOYMENT OF MOUNTED MESSENGERS, ARMORED SIGNAL COMPANY. These messengers are furnished with $\frac{1}{4}$ -ton trucks to provide scheduled and special messenger service from the division CP to each combat command, the reserve command, division artillery, the headquarters rear echelon, and such separate units of the division as are required. Usually, vehicles of the comcenter team are operated from a pool supervised by a dispatcher. Special messengers are provided as needed, but their use is held to a minimum in order to insure efficient scheduled messenger service. Signal company messenger vehicles are used only for message delivery; they are not to be considered as part of the division headquarters motor pool. Training of messengers in map reading, and in the destruction of messages and other material being carried, must be thorough and must be stressed

even during operations. All mounted messengers should be provided with road maps and accurate locations of units and installations to be served; they must be advised of any contemplated move of these units or installations, and must know the axis of signal communication. They must be taught to report changes in road conditions and in locations, and any other information which they learn during their trips. The comcenter chief keeps a map showing the messenger routes and the latest known locations of units and installations. This map will show front lines, areas under intermittent fire, and other useful information. The division SOP should require that liaison officers from all elements of the division check in and out of the CP at the comcenter. By this means, correct information can be kept posted on the map, following questioning of the liaison officer and corroboration of uncertain information. In addition, liaison officers returning to their units can carry messages which otherwise would require a special run by a mounted messenger.

77. EMPLOYMENT OF DISMOUNTED MESSENGERS, ARMORED SIGNAL COMPANY. Dismounted messengers are used within the CP to deliver incoming messages from the comcenter to staff sections only. They are not used as runners between staff sections or from staff sections to the comcenter. They are used, however, to deliver outgoing messages to and from the comcenter and radio stations. One messenger often is detailed to each radio station within the CP.

78. OPERATIONS OF CRYPTOGRAPHIC PERSONNEL, ARMORED SIGNAL COMPANY. Cryptographic personnel are assigned to the message center section. The code clerk must be trained to the highest state of efficiency, in order that encrypting and decrypting of messages will not delay the flow of traffic unnecessarily. Particular care must be taken to safeguard cryptographic systems and equipment. When the comcenter is operating in the field, cryptographic material and equipment are guarded and kept in the message center vehicle, with facilities on hand for their prompt destruction in the event that capture is imminent. The division signal officer will determine which personnel will be allowed to have access to the equipment. When the comcenter is located in a building, cryptographic equipment will be placed in the comcenter so as to be out of view of unauthorized personnel. Unit regulations covering the use, protection, and placement of cryptographic systems, material, and equipment will be issued by the division signal officer, and often will appear as a part of the signal company SOP. All regulations will conform to instructions issued by higher authority.

79. COMCENTER PERSONNEL FOR THE DIVISION COMMAND GROUP. Personnel for the command group are drawn from the comcenter team at the forward echelon. The personnel, transportation, and equipment of the command group comcenter are determined by the officer in charge of the forward echelon comcenter. He will base his decision on the number of personnel and the amount of

transportation and equipment available, as well as the possible length of time which the comcenter must be in operation.

80. OPERATION OF DIVISION COMCENTERS ON THE MARCH. March comcenters are maintained in the principal radio-equipped vehicles of all echelons of the division headquarters in order that a record may be kept of messages handled and cryptographic operations performed while the division is moving. Personnel of the signal company operate these march comcenters. Normally, one code clerk or message center clerk is detailed to ride in each such vehicle. Informal records are kept of messages handled; these records are consolidated when the comcenter is reestablished. Messages may be passed from one vehicle in the column to another by motor messenger or radio. Liaison planes also may be used to deliver and pick up messages. Arrangements for panel displays to designate march comcenters and for sending messages are made by personnel of the comcenter. Special consideration must be given to the need for equipment and space if plans are being made to employ airplane message pick-up.

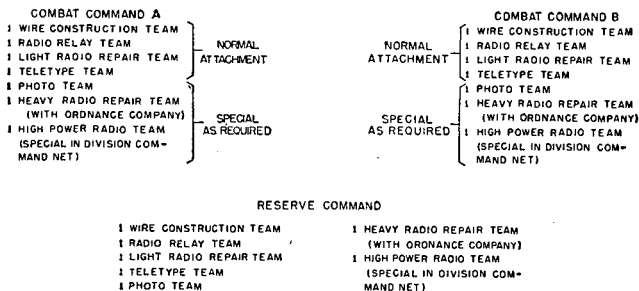
81. ESTABLISHMENT OF A G-2-G-3 MESSAGE CENTER. In CP's and bivouacs, the G-2 and G-3 staff sections usually operate from locations close to one another. In order to provide rapid handling of messages for these staff sections, a message center often is established for them. This message center includes code clerks and messengers who deliver

and handle all cryptographing and decryptographing of messages for these sections. In order to keep a record by which to check the traffic handled, this message center usually is allocated a block of numbers by the comcenter.

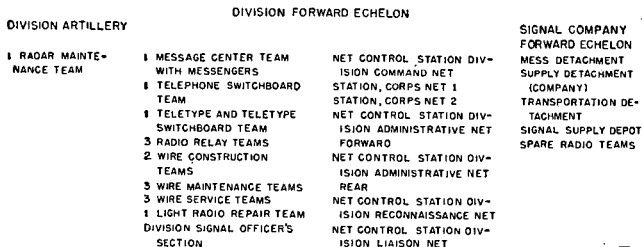
82. OPERATION OF THE DIVISION HEADQUARTERS REAR ECHELON COMCENTER. The comcenter at the division headquarters rear echelon is operated in much the same manner as that at the forward echelon, except that fewer clerks and messengers are used. The rear echelon team often is located in a building, but is equipped to operate from a vehicle assigned to the team. Personnel of the comcenter include message center and code clerks, messengers, and operators of the available means of signal communication located at the comcenter.

83. RADIO TEAMS, ARMORED SIGNAL COMPANY—GENERAL. The radio platoon of the armored signal company provides mobile high-power and medium-power radio stations for nets at forward and rear echelons of division headquarters and at certain subordinate units of the division (fig. 10). The high-power teams are divided into two sections in the platoon. One section contains teams which operate stations in 2½-ton trucks; the other section contains teams which operate stations mounted in armored utility vehicles. The medium-power section also operates stations in armored utility vehicles. For information on armored signal company radio equipment, see figure 11.

COMBAT COMMAND AREA



DIVISION FORWARD AREA



DIVISION TRAINS AREA

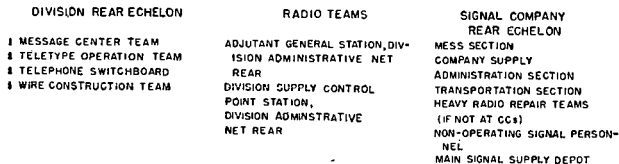


Figure 10. Typical employment of signal teams of the armored signal company.

ARMORED SIGNAL COMPANY

DIV SIG O SEC



RAD PLATOON



LEGEND



SCR-399



SCR-508



SCR-506



SCR-510

Figure 11. Radio sets in the armored signal company.

84. EMPLOYMENT OF HIGH-POWER RADIO TEAMS, ARMORED SIGNAL COMPANY. a. These teams normally are employed at the division headquarters forward echelon as follows:

- (1) Net control station, division command net.
- (2) Net control station, division reconnaissance net.
- (3) Subordinate station, in corps or higher headquarters net.
- (4) Net control station, division administrative net (rear).

b. These teams normally are employed in the division headquarters rear echelon administrative net as follows:

- (1) Adjutant general station.
- (2) Division supply control point station.

c. Conditions will arise under which subordinate units will need additional high-power radio sets to operate with high-power stations located at the division headquarters forward echelon. When additional sets are needed, they will be authorized to the signal company by the signal officer of higher headquarters. Such need will arise in the division command net, for example, when combat commands are on missions involving distances of more than 15 or 20 miles, or when combat commands are operating over terrain which is unfavorable to radio communication.

85. EMPLOYMENT OF MEDIUM-POWER RADIO TEAMS, ARMORED SIGNAL COMPANY. a. These teams normally are employed in the division headquarters forward echelon as follows:

- (1) Net control station, division liaison net.
- (2) Net control station, division administrative net (forward).

b. The remaining four teams of this section may be held as spares or used as required on order of the division signal officer. These uses may include air warning, air request, and special administrative nets, and special stations in existing nets. The teams also may be used as division stations with adjacent units.

86. LOCATION OF RADIO STATIONS IN THE DIVISION HEADQUARTERS FORWARD ECHELON. In the forward echelon of division headquarters, radio stations normally are located near the staff sections with which they work. In many cases, the location of the radio stations and staff vehicles will be prescribed in the division SOP.

87. WIRE TEAMS, ARMORED SIGNAL COMPANY—GENERAL. To accomplish the wire mission of the armored signal company, wire construction, maintenance, and operation teams (fig. 10) are employed. The teams which install and maintain the wire lines are in the construction platoon. While they are designated as *construction*, *maintenance*, and *service* teams, they normally are employed according to the desires of the division signal officer and the field line construction officer in order to accomplish their mission most efficiently.

The wire operation teams, which are made up of personnel of the telephone and teletype and radio relay sections of the operations platoon, are organized to install and operate the local wire systems within the echelons of the division headquarters and to operate switching centrals when required.

88. WIRE CONSTRUCTION TEAMS, ARMORED SIGNAL COMPANY.

a. The six wire construction teams, made up of approximately eight men each, normally operate with two teams at division headquarters forward echelon, one team at division headquarters rear echelon, and three teams available for attachment to combat commands, reserve command, or other units as required. The two teams at division headquarters forward echelon lay trunk lines to combat commands and prescribed units, and assist in installing and maintaining other trunks as required. The team at division headquarters rear echelon lays lines to units in the service area, lays local lines within the rear echelon, and when possible lays lines to division headquarters forward echelon.

b. Since only sufficient wire personnel are assigned to the combat and reserve commands to install local lines within the command headquarters, the armored signal company wire construction teams which are attached to combat commands install and maintain wire circuits from combat command headquarters to subordinate units of the combat command. Close liaison between the division field line construction officer and the communication officers at combat and

reserve commands is necessary to insure proper installation and maintenance of wire circuits. The division signal officer and the field line construction officer will direct the employment of teams at division headquarters echelons. The communication officers of the combat commands, subject to the approval of the division signal officer, will direct the employment of teams attached to them. The mission of each team will vary with the unit with which it is operating, depending largely on the desires of the division and combat command commanders. In most units, the missions of the various teams and their attachment to divisional units will be included in the signal company SOP.

89. WIRE MAINTENANCE TEAMS, ARMORED SIGNAL COMPANY. Usually, these three teams are located at the division headquarters forward echelon wire construction headquarters, in order to be available for emergency work. They normally operate under the supervision of the field lineman chief. Their principal mission is trouble-shooting on trunk and long local lines. They can be used for the construction of short local lines and installation of equipment used with these lines. The maintenance teams also may be used as small wire construction teams, with definite lines to construct according to SOP. Such a system often is used by division signal officers who feel that more efficient wire construction is obtained when the installing team is held responsible for maintenance of lines constructed by it.

90. WIRE SERVICE TEAMS, ARMORED SIGNAL COMPANY. These teams are part of platoon headquarters and service section, construction platoon, and may be located where they will be able to perform most effectively the work of picking up and servicing wire and maintaining platoon supplies and equipment.

91. TELEPHONE SWITCHBOARD TEAMS, ARMORED SIGNAL COMPANY. These teams are organized to install and operate the local wire systems within the echelons of the division headquarters (fig. 10) and to operate switching centrals when required. The personnel include men who lay wire and install telephones to offices, and operators for the division telephone switchboards. Normally, personnel and equipment for switching centrals will be drawn from the team operating in the forward echelon. A smaller team will operate the installation at the rear echelon. The actual number of men, the transportation, and the equipment in teams will be determined by the division signal officer and wire operations officer after a study of the state of training of personnel, equipment available, and tactical demands. Telephone switchboard and teletypewriter operators in a limited number, with necessary equipment, also may be attached to combat and reserve commands to operate equipment over lines installed by construction platoon personnel. In selecting a site for the telephone switchboard at division headquarters forward echelon, consideration must be given to protection of the installation and personnel, accessibility to

wire lines, and freedom from noise and other interference with operations. The same general considerations will be used as a guide in selecting sites for switchboards operated at other locations.

92. TELETYPEWRITER OPERATION, ARMORED SIGNAL COMPANY. As previously stated, teletypewriter operators will be attached to operate teletypewriters at combat commands and other locations as required (fig. 10). When teletypewriters are used at combat and reserve commands, a teletypewriter switchboard will be installed and operated by personnel of the teletype team located at division headquarters forward echelon. Into this switchboard will be installed teletype circuits from corps as well as the division units.

93. RADIO RELAY TEAMS, ARMORED SIGNAL COMPANY. These teams have the personnel and equipment necessary to provide voice and teletype radio relay channels between division headquarters forward echelon and each combat command and reserve command as required (fig. 10). They are assigned by the division signal officer to normal or special missions and may be shifted at his discretion. These teams are provided with equipment mounted in 2½-ton trucks. They can be employed—

a. In situations where it is not feasible to install a complete wire circuit.

b. As an alternate circuit when wire circuits develop trouble.

c. As a means of spanning ground which is denied to wire teams by the enemy or by difficult terrain features.

94. RADIO REPAIR TEAMS, ARMORED SIGNAL COMPANY—GENERAL. The seven radio repair teams in the armored signal company are assigned by the division signal officer to provide field maintenance of all signal equipment in the division (fig. 10). Four of the teams are designated as light, three as heavy. Each of the four light teams is provided with an armored utility vehicle for transportation; these teams normally operate in a tent or building, using the truck primarily to transport personnel and equipment. Each of the three heavy teams is set up in a Signal Corps repair truck, and repair work usually is carried on in the vehicle. The telephone and telegraph repairmen and the camera repairman may be placed either in the light team which remains at division headquarters forward echelon, or in one of the heavy teams, at the discretion of the division signal officer.

95. LIGHT RADIO REPAIR TEAMS, ARMORED SIGNAL COMPANY. In normal operations, one light radio repair team consisting of from three to five repairmen will be attached to each combat command headquarters forward echelon, one to reserve command headquarters forward echelon, and one to division headquarters forward echelon. They are provided with the necessary transportation and signal maintenance equipment to perform limited field maintenance of signal equipment for the units to which they are attached. The teams may be shifted at the discretion of the division signal officer when tactical conditions so warrant. Each team carries a limited number of spare parts and

replacement radio sets of the type used by the unit served. The light team which performs maintenance duties at division headquarters forward echelon is set up usually in the signal company forward echelon. The light teams attached to the combat command and reserve command headquarters should be required to make frequent trips to all units of these commands for the purpose of expediting the replacement and minor repairs of signal equipment.

96. HEAVY RADIO REPAIR TEAMS, ARMORED SIGNAL COMPANY. The location of the heavy teams is determined by the division signal officer. These teams, each consisting of from three to six repairmen, are equipped to provide field maintenance of all signal equipment in the division. One possible method of operation is to attach one such team to each lettered company of the ordnance maintenance battalion, to make minor repairs on or to replace defective or missing equipment in vehicles being repaired by the ordnance company. Another method is to have the teams operate at the rear echelon of the signal company, with a detachment at each ordnance company to perform the same functions as a full team. In either situation, proper operation of these teams requires effective coordination between the operations officer of each ordnance company and the noncommissioned officer in charge of the radio repair team or detachment.

97. RADAR MAINTENANCE TEAM, ARMORED SIGNAL COMPANY. The radar maintenance team consists

of personnel, equipment, and transportation necessary to perform field maintenance on all radar equipment used in the division and attached units. Like the heavy radio repair teams, the radar maintenance team is set up in a Signal Corps repair truck. Since the bulk of radar equipment is located in the division artillery, the team often is attached to division artillery headquarters forward echelon (fig. 10).

98. DIVISION SIGNAL SUPPLY ACTIVITIES. a. Signal supplies for the armored division are under the control of the division signal officer.

b. Requisition, procurement, storage, issue, and other phases of signal supply are coordinated and supervised by the division signal officer with higher headquarters and subordinate units, through the signal supply element of the supply, photo, and maintenance section.

c. To maintain a proper flow of signal supplies to divisional and attached units, the signal supply element operates signal dumps.

d. Supplies are released to the division signal supply element, at a depot or truckhead, by a higher signal supply echelon. The supplies then are stored for issue by the supply element to using units.

e. Supply officers of subordinate units are permitted to deal directly with the division signal officer or the signal supply officer on signal matters, within limits of the policies prescribed by the commanders concerned.

f. Signal supplies issued to subordinate units normally are in class II or IV.

g. Using units are responsible for procuring supplies from the division signal dump and transporting them to the unit. Since the artillery is the heaviest user of wire (with exception of the signal company), arrangements usually are made with the artillery communication officer to insure that trucks going to the rear for new supplies include artillery transportation, in order to save rehandling.

h. Signal supply requirements for units must be anticipated by unit commanders and their communication officers sufficiently far in advance of operations to allow for the necessary delay incident to routine administration between the time the requisition is submitted and the time the supplies are available for issue.

i. The main signal supply dump is located so that it will be convenient to the using units of the division. For instance, the dump may be set up in the vicinity of the ordnance maintenance battalion in order that vehicles dispatched to pick up spare parts for vehicular maintenance also may pick up signal supplies on the same trip.

j. In many cases, a forward dump for the supply of batteries, wire, antennas, tubes, crystals, and similar items may be set up. This advance dump may be located in the vicinity of the forward echelon of the signal company, or may be set up farther forward. The location is governed by the principle of service to using units.

k. The supply element carries a quantity of reserve equipment, which is issued to subordinate units of the division as replacements for equipment being repaired. The amount carried is limited by the transportation available during tactical operations.

CHAPTER 3

ARMORED DIVISION HEADQUARTERS

Section I. MISSIONS AND ORGANIZATION, ARMORED DIVISION HEADQUARTERS AND HEADQUARTERS COMPANY, AND MILITARY POLICE COMPANY

99. MISSIONS. **a. Division headquarters.** This unit has the mission of command, control, and administration of all organic elements of the armored division and of all attached units.

b. Division headquarters company. This company provides the necessary administration, mess, maintenance, supply, transportation, and local security for the forward echelon of division headquarters. Trains headquarters company provides similar service for the rear echelon of division headquarters.

100. ORGANIZATION OF DIVISION HEADQUARTERS. Command of the division is vested in the commanding general, who is provided with a staff to assist him in commanding the division by providing information, data, and advice; by preparing detailed plans and orders as he may direct; and by exercising such supervision over the execution of his orders as he may prescribe. The detailed or-

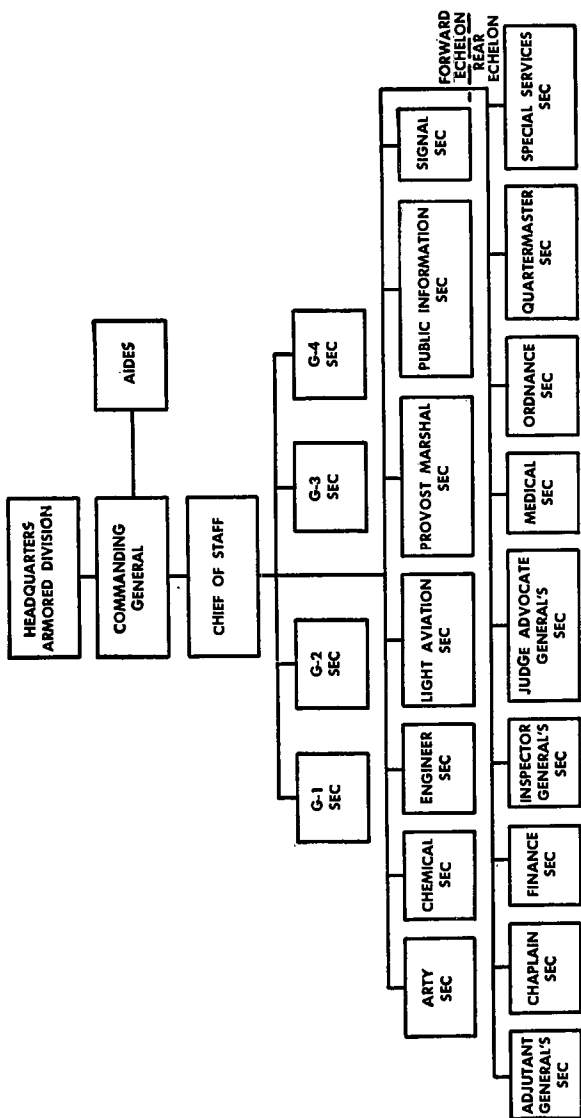


Figure 12. Organizational chart, headquarters, armored division.

ganization for division headquarters is prescribed by T/O&E 17-1N. The major elements are shown in figure 12.

101. ORGANIZATION OF DIVISION HEADQUARTERS COMPANY. The company commander of division headquarters company is provided with a company headquarters which furnishes the personnel for supervision and planning of the company operations and for the internal company administration, supply, and maintenance. In addition, certain platoons and sections are incorporated within the company to provide service for the division headquarters. The radio sets of this company are shown in figure 13. The detailed organization is prescribed by T/O&E 17-2N. The major elements are shown in figure 14.

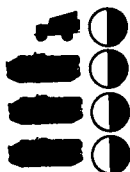
102. ORGANIZATION AND MISSIONS, MILITARY POLICE COMPANY. a. This company has the mission of—

- (1) Enforcing military laws and regulations, and maintaining order.
- (2) Enforcing traffic regulations and control.
- (3) Protecting property.
- (4) Handling prisoners of war.
- (5) Controlling circulation of individuals.
- (6) Operating straggler lines.

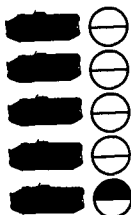
b. To accomplish the above, the company is provided with a company headquarters which provides personnel for planning and supervision of company operations and for the internal company administration, supply, and maintenance. In addi-

HQ Co ARMD DIV

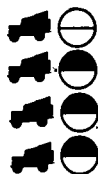
DEF PLAT



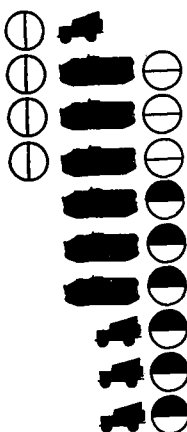
ARMD SEC



L AVN SEC



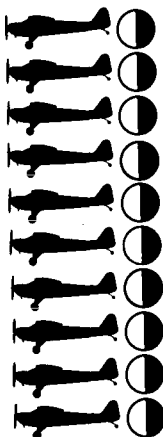
CG & STAFF SEC



CO HQ



LN PLANES



LEGEND

-  SCR-506
-  SCR-508
-  SCR-528
-  SCR-509 & 510

Figure 13. Radio sets in division headquarters company.

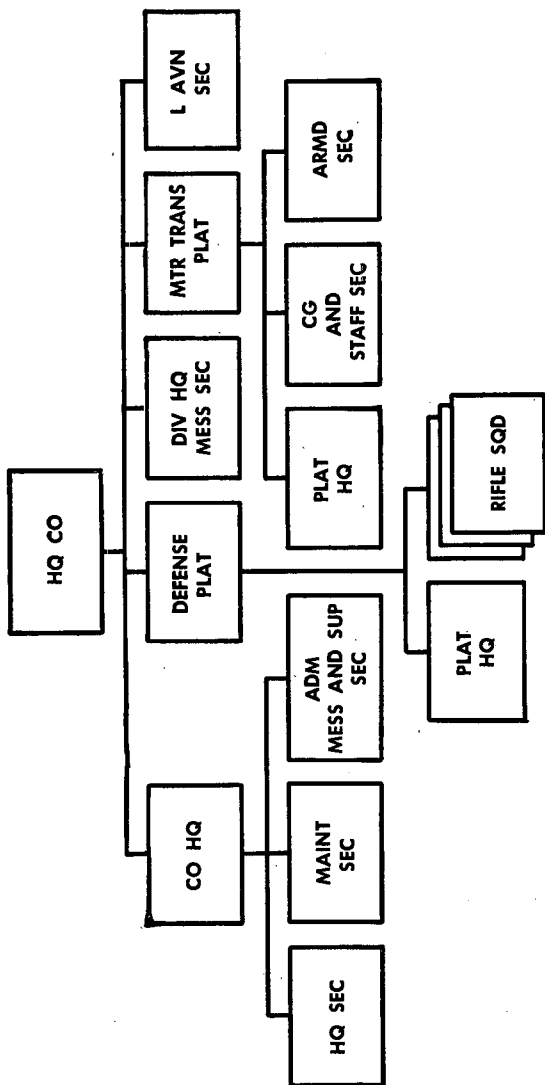


Figure 14. Organizational chart, headquarters company, armored division.

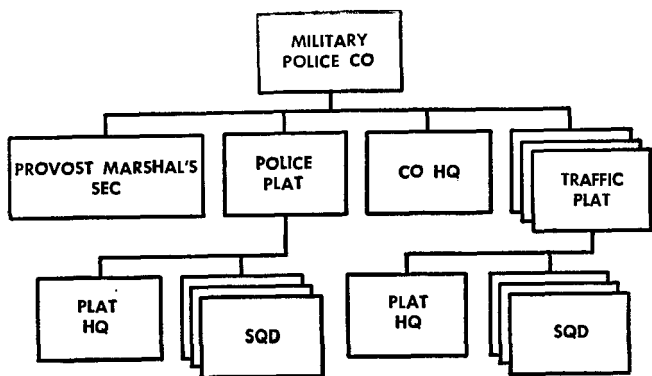


Figure 15. Organizational chart, military police company.

tion, there are four platoons which perform the operations. The detailed organization is prescribed by T/O&E 19-27N. Major elements are shown in figure 15, and radio nets in figure 16.

103. COMMUNICATION IN DIVISION HEADQUARTERS—GENERAL. The agencies and means of signal communication available to division headquarters may be divided into two categories: those furnished by the headquarters company, and those furnished by the armored signal company.

104. RADIO FACILITIES AVAILABLE TO DIVISION HEADQUARTERS. a. Three general types of radio sets are employed:

- (1) High-power vehicular radiotelegraph-telephone (amplitude-modulated) sets provide communication to higher headquarters, to combat commands, and be-

MILITARY POLICE COMPANY

TRAFFIC PLATOONS

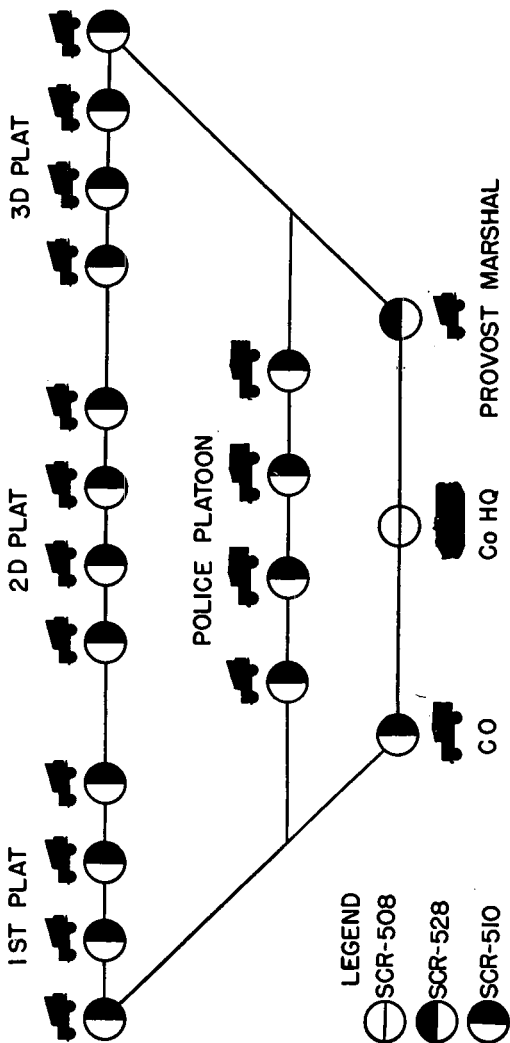


Figure 16. Radio nets, military police company.

tween the forward and rear echelons of division headquarters. One of these sets may be assigned to each combat command if conditions so warrant.

- (2) Medium-power vehicular radiotelegraph-telephone (amplitude-modulated) sets provide communication to lower units, adjacent units, and attached units, and in special nets which the tactical situation may dictate.
- (3) Medium-power and low-power vehicular radiotelephone sets provide communication between echelons, vehicles, and staff sections of the headquarters and headquarters company, and between the division and aircraft.

b. Radio operators are authorized for the medium-power and high-power radiotelegraph-telephone sets. The medium-power and low-power voice sets usually are operated by personnel of the sections concerned.

105. WIRE FACILITIES AVAILABLE TO DIVISION HEADQUARTERS. The wire facilities available to the headquarters include telephone to higher headquarters, adjacent units, combat commands, and other major units of the division; and radio relay and teletype facilities to higher headquarters and combat commands.

106. MESSENGER COMMUNICATION IN DIVISION HEADQUARTERS. Messengers mounted in $\frac{1}{4}$ -ton trucks, provided by both the division headquarters

company and the armored signal company, are under control of the message center. They are used for both scheduled and special messenger runs and may be used either mounted or dismounted. When the situation warrants, certain messengers may be scheduled to operate with staff sections.

107. VISUAL COMMUNICATION IN DIVISION HEAD-QUARTERS. Visual signals are particularly valuable as an auxiliary means of communication for the transmission of short prearranged messages. Visual signals, such as flags, pyrotechnics, and arm and hand signals, are indispensable for short-range communication when normal means, such as radio, fail.

108. SOUND COMMUNICATION IN DIVISION HEAD-QUARTERS. Sound signaling is used chiefly to attract attention and to give the alarm in case of gas, air, or mechanized attack, by use of whistles, bugles, sirens, klaxons, small-arms fire, or other sound-making devices.

109. PHOTOGRAPHIC FACILITIES IN DIVISION HEAD-QUARTERS. Photo teams from the armored signal company may be made available at any time. For further information as to the organization, capabilities, and limitations of these teams, see paragraph 69.

110. USE OF LIAISON PLANES BY DIVISION HEAD-QUARTERS. The aircraft of the light aviation section of the division headquarters company can be

used to great advantage in establishing and maintaining signal communication within the division. Although the majority of these planes probably will be made available to the combat commands, the reconnaissance battalion, and the tank and armored infantry battalions, the remainder will be available for transporting messengers and couriers to higher and lower headquarters. Under exceptional circumstances, one or more of these planes may be used as relay stations in voice radio nets. These planes also can be used to locate new headquarters sites.

Section II. ORGANIZATION FOR COMBAT, ARMORED DIVISION HEADQUARTERS

111. FLEXIBILITY OF THE ARMORED DIVISION. The armored division is organized to provide flexibility in the formation of combined arms teams. This flexibility is provided by the combat command-separate battalion organization. The combat commands are tactical headquarters directly under the division commander; they have no organic troops other than those in their own headquarters companies. Each battalion of the armored division is self-sufficient administratively. Combat and service elements of the division are attached to or placed in support of combat commands for each operation. The division commander makes these attachments, basing them on an evaluation of the mission, enemy, terrain, weather, and scheme of maneuver. After considering the combat characteristics peculiar to tanks, armored infantry,

armored artillery, armored engineers, and reconnaissance elements, the division commander attaches these elements to the combat commands (or places them in support) in the ratio which best fits the mission. Added to these combat elements is the essential support from the ordnance maintenance battalion, armored medical battalion, and quartermaster battalion. The attachment of units made initially is not regarded as fixed. The combat commands may be reinforced from the division reserves, or fresh units may replace units in the assaulting combat commands to retain the momentum of the attack.

112. ORGANIZATION FOR COMBAT, DIVISION HEADQUARTERS AND HEADQUARTERS COMPANY. a. The armored division headquarters and the division headquarters company, the organizations of which are outlined in paragraphs 100 and 101, have a combined strength of approximately 350 officers and enlisted men. In addition, there are many attachments from other units of the division, such as the armored signal company, military police company, armored engineer battalion, and armored division artillery, which augment the size of the division headquarters.

b. The armored division headquarters normally is divided into a command group, a division headquarters forward echelon (command post), and a division headquarters rear echelon.

c. The division artillery commander will designate the location of the headquarters and headquarters battery of division artillery and the head-

quarters and headquarters battery of the anti-aircraft artillery battalion. They ordinarily will be near the division command post unless communication difficulties require a position closer to subordinate elements.

d. The division quartermaster will operate with headquarters and headquarters detachment, quartermaster battalion. The division ordnance officer will operate with headquarters and headquarters company, ordnance maintenance battalion. The division provost marshal will operate at the division PW enclosure, the location of which will be announced in the division administrative order.

113. ORGANIZATION FOR COMBAT, DIVISION COMMAND GROUP.

a. The purpose of the command group is to directly supervise the execution of operations, render prompt decisions for changes in plans, receive reports from the forward echelon of division headquarters which pertain to the situation, and keep higher headquarters informed of the situation through the forward echelon. It remains highly mobile and well forward during actual operations. During battle, the commander generally is accompanied by the assistant G-3 Air and/or a forward controller, and the division artillery commander or his liaison officer.

b. Composition of the command group normally is as follows:

- (1) The commanding general.
- (2) Aides.
- (3) Staff officers designated by the commanding general.
- (4) Necessary enlisted personnel.

114. ORGANIZATION FOR COMBAT, DIVISION HEAD-QUARTERS FORWARD ECHELON (COMMAND POST) a.

The purpose of the forward echelon is to establish and maintain communication with higher, adjacent, supporting, and subordinate units; make reports to the command group on new developments pertinent to the situation; make plans for future operations; provide for liaison with adjacent and higher units; and supervise liaison from supporting and subordinate units.

b. See figure 12 for the normal composition of the forward echelon.

115. ORGANIZATION FOR COMBAT, DIVISION HEAD-QUARTERS REAR ECHELON. a.

The purpose of the rear echelon is to perform administrative and certain logistical functions for the division, and to dispatch information pertaining to these functions to the forward echelon.

b. See figure 12 for the normal composition of the rear echelon.

116. LOCATION AND ARRANGEMENT OF DIVISION COMMAND POST. See paragraphs 25 and 26 for the definition of a command post and factors to be considered in selecting its location. For a typical arrangement of a division command post, see figure 17.

a. If not prescribed by higher headquarters, location of the division command post is prescribed by the division commander. Recommendation for its general location is made to the commander by the G-3, following consultation with the signal

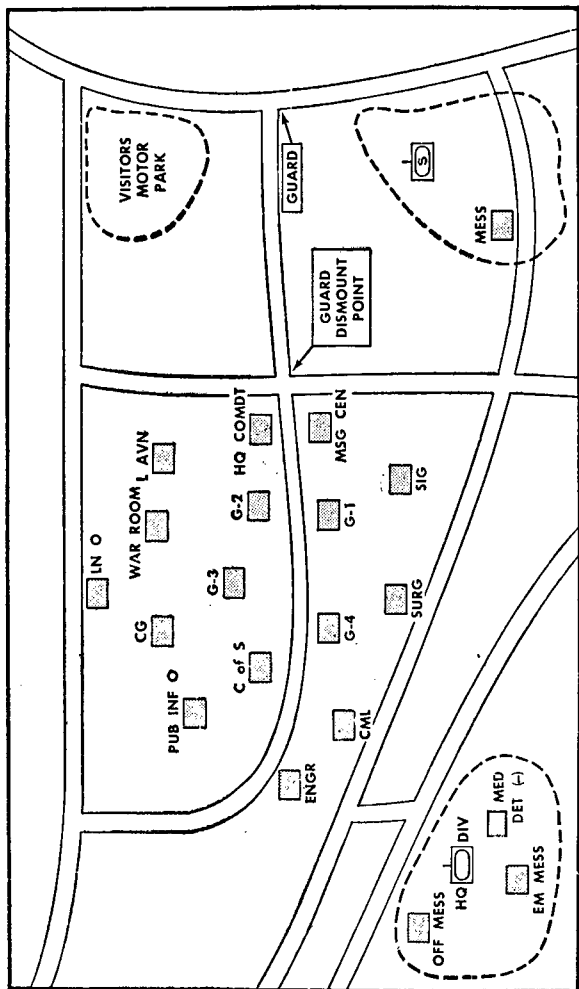


Figure 17. A typical arrangement of an armored division command post.

officer. The headquarters commandant, accompanied by the signal officer or his assistant, selects the exact site in the general vicinity of the designated point.

b. The communication center, operated by personnel from the armored signal company, is located in the command post where it easily can be seen and reached by incoming messengers and others without interfering with other command post installations.

c. Locations of vehicles within the command post established in the field normally are indicated by the division standing operating procedure. When the command post is established in buildings, the radio-equipped vehicles are located near the staff sections, or the radio sets are operated from the staff sections by use of remote control systems.

d. The switchboard is installed and operated by signal company personnel. Its location affords as much cover, shelter, and freedom from interference as possible. Telephones are installed as required. The division signal officer, in conjunction with G-3, will establish a priority for the installation of local circuits.

117. OPERATION OF DIVISION COMMAND POST. a.

The command post is organized for continuous operation. Signal teams are organized so that adequate personnel are on duty at all times, and shifts are arranged so that personnel receive necessary rest.

b. All personnel of the message center are

trained in the duties performed by each member of the team. In stable situations, the message center personnel operate as a team; but, during moving situations, the message center personnel are assigned to staff sections as the traffic load and situation require. During moving situations, each member of the message center will keep necessary records.

c. All incoming messengers will go first to the message center. Special messengers will be directed to the addressee, who will receipt for the message. When leaving the command post, all messengers and all liaison officers will pick up messages addressed to their own units.

d. Outgoing written messages usually are sent through the message center. During marches, the representatives of the message center with each staff section handle outgoing messages. The use of messengers is coordinated by the message center chief.

e. Whenever practicable, scheduled messenger runs are established. Full use is made of this service in order that special message runs may be kept to a minimum. Runs are scheduled so that normal administrative reports and messages will be delivered without delay. Special messengers will be designated and used as required.

f. Officers see that a synopsis of each message sent or received orally, by telephone or by voice radio, is entered in the staff journal.

118. CONDUCT OF DIVISION COMMAND POST PERSONNEL. Personnel of the command post are re-

quired to perform their duties quietly and in an orderly manner. They are not permitted to loiter in the vicinity of the message center, the switchboard, radio stations, or other command post installations where their presence encourages confusion, congestion, or distraction of operating personnel. All personnel are warned against movement which might disclose the command post to enemy observation, and are instructed to avoid making paths or vehicular tracks within the command post area.

119. SECURITY OF THE DIVISION COMMAND POST.

The command post must be provided with a well-planned system for local protection. The headquarters commandant is responsible for this security. He uses available personnel of the headquarters company and such other troops as may be detailed for this purpose. Signal personnel normally are not available for scheduled guard or sentry duty within the division command post area, because of the nature of their duties. They are, however, organized and trained as part of a reserve to be used in case of actual attack of the command post. For the protection of personnel, slit trenches are dug to provide individual protection against air or ground attack. Consideration should be given to locating the command post within the perimeter of the division reserve.

120. RADIO COMMUNICATION, DIVISION HEAD-QUARTERS—GENERAL.

Radio is the principal means of communication employed by the armored divi-

sion. Sufficient radio personnel and equipment are provided to handle most of the message traffic during fast-moving situations. High-, medium-, and low-power radio sets, installed in appropriate vehicles supplied by the armored signal company, are used in the division headquarters to carry on radio communication to higher, lower, and adjacent units. Radio operators from the armored signal company operate the high- and medium-power radiotelegraph-telephone sets. Personnel from the division headquarters, usually officers from the staff sections, operate the medium- and low-power voice radio sets.

121. RADIO COMMUNICATION BETWEEN DIVISION AND HIGHER HEADQUARTERS. The armored division operates a secondary station in a net of the next higher headquarters, normally in the corps command net. This net, employing high-power radio sets, usually uses radiotelegraph or teletype transmissions, but may be switched to voice transmission when desired. The corps command net is used for tactical control and command, and traffic over this net pertains to tactical operations. One of the high-power radio sets of the armored signal company is used for the division's secondary station in this net.

122. NORMAL DIVISION RADIO NETS. The armored division operates four nets for communication with subordinate units.

a. The *division command net* (fig. 18) is used for tactical control and command. It handles mes-

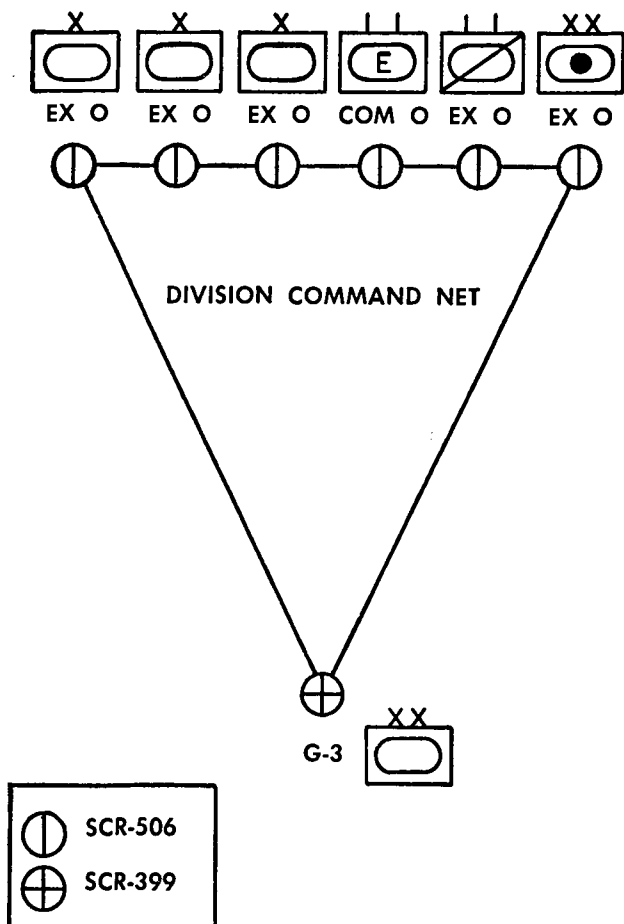


Figure 18. Typical radio net, division command net.

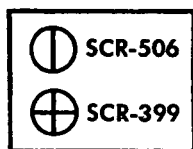
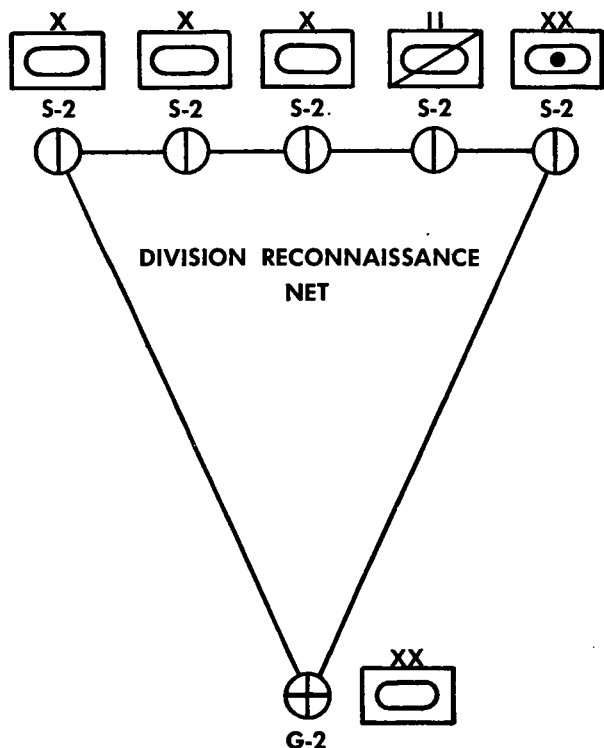


Figure 19. Typical radio net, division reconnaissance net.

sages pertaining to tactical operations. The station of the division G-3 is the net control station.

b. The *division reconnaissance net* (fig. 19) is used for the exchange of messages pertaining to the enemy. The radio station of the division G-2 is the net control station. He is in direct communication with the S-2's of the combat and reserve commands, reconnaissance battalion, and other units as required.

c. The division administrative nets (fig. 20) are used for the purpose of exchanging administrative messages pertaining to supply, evacuation, personnel, and like matters. The *division administrative net (forward)* provides communication between the division G-4 and the S-4's of forward units operating directly under division control. The *division administrative net (rear)* provides communication between the division G-4 and the rear echelon, division trains, the division supply control point, the division ammunition officer, and the service battalions. The division supply control point (DSCP) operates stations in both the forward and rear nets. This provides a direct channel between forward and rear units and the DSCP.

d. The S-4 of the 155-mm armored field artillery battalion normally is in the division administrative net (forward) when the battalion is in general support of the division. In a situation where the battalion is in direct support of a combat command or battalion combined arms team, it reports out of the division administrative net (forward) and into the administrative net of the combat command or team which it is supporting.

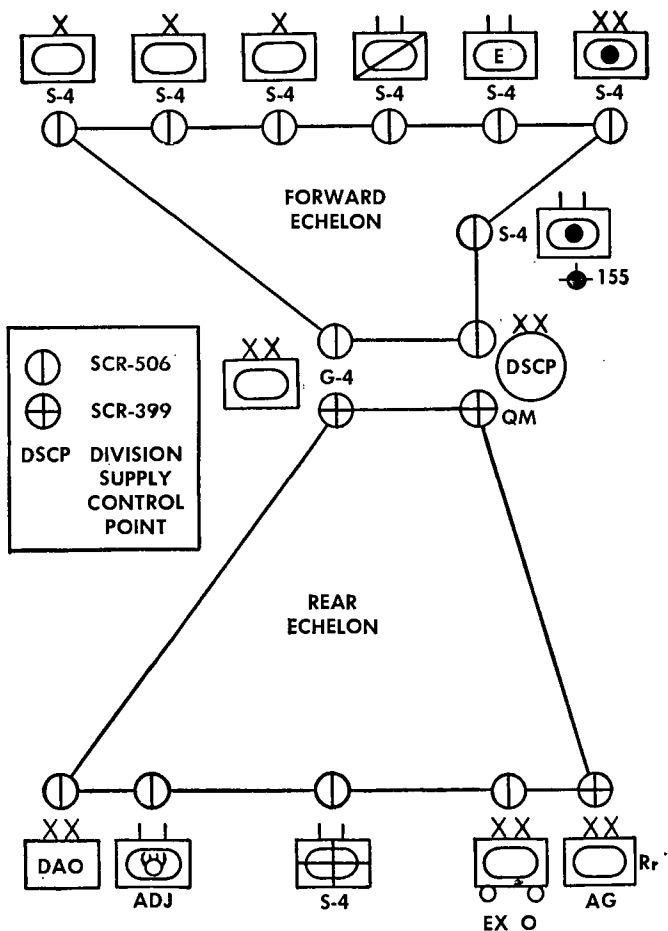


Figure 20. Typical radio nets, division administrative nets.

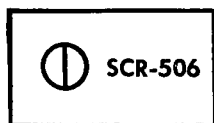
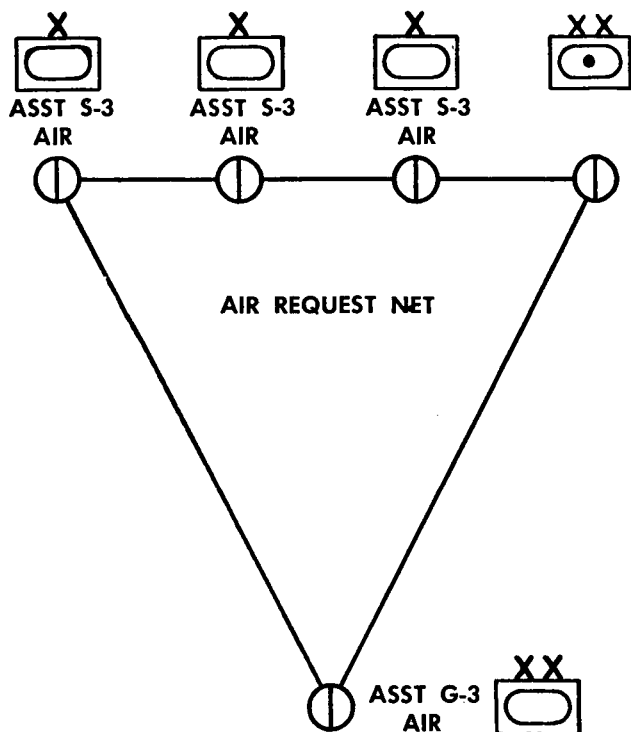
Conversely, the S-4 of a 105-mm armored field artillery battalion which is placed in general support of the division normally reports out of a combat command administrative net and into the division administrative net (forward).

123. ADDITIONAL DIVISION RADIO NETS. The division will operate other nets to subordinate units when the situation so warrants. Two such radio nets which may be established are—

a. The *division air-request net* (fig. 21), which provides instant and direct communication between the assistant G-3 Air and assistant S-3's Air of the combat and reserve commands and division artillery. The principal use of this net is for transmission of air requests and for the exchange of information pertaining to air-ground operations.

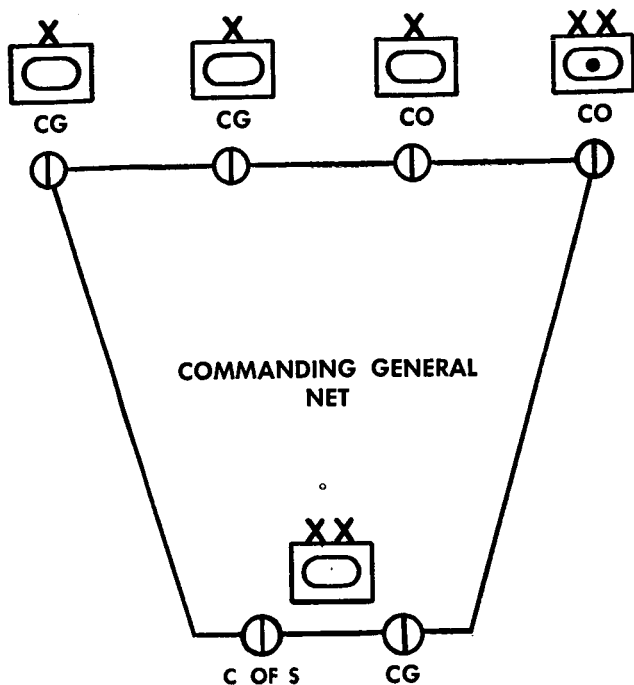
b. The *commanding general net* (fig. 22), which provides a direct channel of communication between the division commander and the commanders of units operating directly under division. The division chief of staff has a secondary station in this net. Both the commanding general's vehicle and the chief of staff's vehicle, together with radios and operators, are organic to the division headquarters company. When established, this net is used for direct radio contact between commanders.

124. RADIO COMMUNICATION BETWEEN DIVISION AND ADJACENT UNITS. The *division liaison net* (fig. 23), when established, provides contact with



NOTE: OTHER UNITS
AS REQUIRED MAY EN-
TER THIS NET

Figure 21. Typical radio net, division air-request net.



NOTE: EITHER THE C OF S OR THE CG MAY ACT AS NET CONTROL STATION

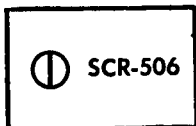
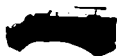


Figure 22. Typical radio net, commanding general net.

LN O WITH LEFT
FLANK DIV

LN O WITH RIGHT
FLANK DIV



DIVISION LIAISON NET



NCS



SCR-506

Figure 23. Typical radio net, division liaison net.

one or both flanking divisions. As a rule, one vehicle with a medium-power radiotelegraph-telephone set remains in the division command post, acting as net control station, while a similar vehicle is dispatched to one or both flanking divisions. These vehicles, complete with operating personnel, are provided by the armored signal company. A liaison officer will accompany and command each of the vehicles dispatched to adjacent units. This net is under the supervision of the chief of staff.

125. INTERSTAFF RADIO COMMUNICATION, DIVISION HEADQUARTERS. a. Each armored vehicle and many unarmored vehicles of the division headquarters are authorized medium- or low-power voice radio sets. The stations operate together on a *division headquarters net*. The voice radio station of the chief of staff or the headquarters commandant usually is designated as the net control station. This net is used for communication between sections and vehicles during marches and for communication between the forward echelon and command group.

b. Whenever staff officers or liaison officers are on missions away from the command post, they can maintain contact with the command post and command group over the division headquarters net if extended distances do not preclude the use of voice radios. When extended distances do preclude the use of voice radios, these officers can be provided, by the armored signal company, with vehicles which have radiotelegraph-telephone sets

installed. In this latter case, the radios can be entered into the division liaison net.

126. AIR-GROUND COMMUNICATION, DIVISION HEADQUARTERS.

a. Liaison planes organic to the armored division are equipped with low-power voice radio sets. Communication is obtained by presetting the proper channel on available radio sets within the unit.

b. The armored division may have a radio team from the signal air-ground liaison (AGL) company to operate a secondary station in the army G-3 Air net. This radio net provides direct communication between the assistant G-3 Air of the division and the G-3 Air of the army. The purpose of this net is to transmit air requests and to exchange information pertaining to air-ground operations.

127. MAINTENANCE OF DIVISION HEADQUARTERS SIGNAL EQUIPMENT.

Using personnel are trained and required to accomplish user maintenance on signal equipment. The headquarters company of the armored division has one radio repairman to perform necessary maintenance and repairs, and to make such inspections as may be required, on signal equipment organic to that company. Field maintenance is performed by a light radio repair team from the forward echelon of the armored signal company,

128. WIRE COMMUNICATION, DIVISION HEADQUARTERS—GENERAL.

Wire communication is used to

supplement radio communication. During certain situations, it may become the principal means of communication. The tactical situation, the time available for construction, and the planned use of the wire system are the predominant factors governing its use. Wire communication normally will be established between corps and division, and between division and combat commands, except in rapidly moving situations.

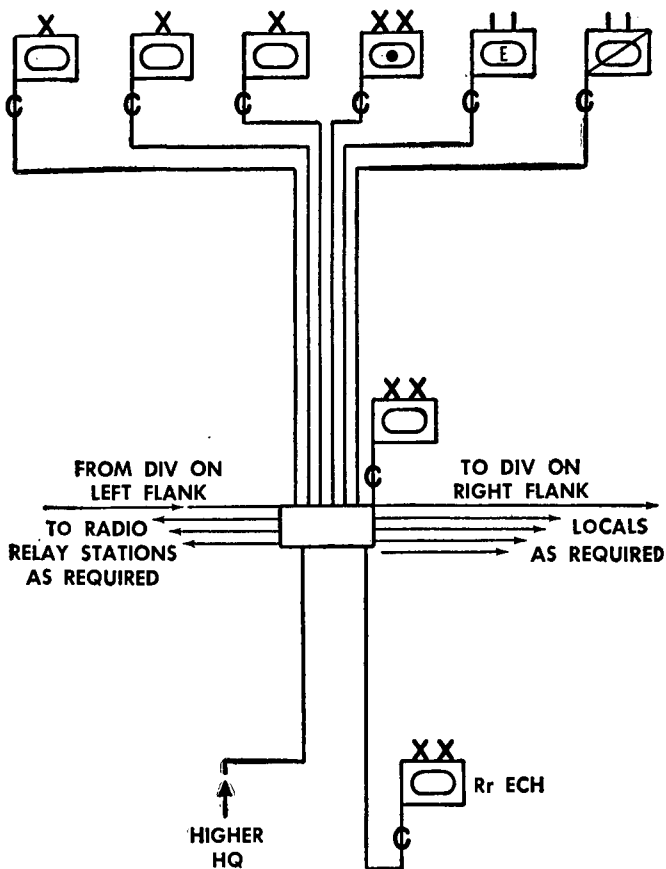
129. LOCAL WIRE INSTALLATION, DIVISION HEAD-QUARTERS. The switchboard and local lines are installed, maintained, and operated by personnel from the armored signal company. Lines are placed overhead or otherwise protected to prevent destruction by moving vehicles or personnel. The switchboard is located in a position convenient to trunk and local lines, preferably in a covered position. It should be located so as to be safe from enemy fire. The exact location depends on the local situation and terrain. Often the switchboard may be located in a dugout or basement; or, if an adequate location is not available, it may be placed in an armored vehicle or a prepared fox hole. Operators must be alert, courteous, and efficient; they must have a complete knowledge of the wire network and telephone directory so that they quickly and accurately can put through calls.

130. WIRE COMMUNICATION BETWEEN DIVISION AND HIGHER HEADQUARTERS. The next higher headquarters is responsible for maintaining wire communication to the division. However, it is only

through constant coordination and endeavor by both units that adequate communication can be maintained. Normally, two trunk lines will connect the two headquarters. Both telephone and teletype service are provided.

131. WIRE COMMUNICATION BETWEEN DIVISION AND ADJACENT AND SUBORDINATE UNITS. The division is responsible for maintaining wire communication to subordinate units. One or two field wire trunk lines are laid to combat and reserve commands and other major units. Teletype communication may be provided to the combat commands, when desired. Lateral lines are constructed between the division and adjacent units and between subordinate units whenever time and the situation permit. See figure 24 for a typical division wire telephone net.

132. RADIO RELAY COMMUNICATION, DIVISION HEADQUARTERS—GENERAL. Radio relay communication is integrated into the wire system and is used to replace or augment field wire circuits. Each of the six radio relay teams contains sufficient personnel and equipment to establish one terminal of a radio relay circuit. Normally, three of these teams will operate in the division command post, and one in each of the combat and reserve commands. Corps provides the team for radio relay communication with that headquarters. Each team is mounted in a 2½-ton truck and equipped with radio sets, power equipment, spare parts, and other operating equipment and personnel to in-



NOTE: ONE OR MORE TELEPHONE LINES
CONSTRUCTED FROM DIV HQ TO SUBORDI-
NATE UNITS AS REQUIRED

Figure 24. Typical division wire telephone system.

stall, operate, and maintain the radio relay terminal.

133. OPERATION OF RADIO RELAY EQUIPMENT. a.

Because of the very high frequencies used by the radio sets of the radio relay team, the team must be located so that an almost line-of-sight path is obtained between terminals. The radio sets will operate for distances of up to 25 miles, depending upon the intervening terrain and technical considerations. The radio relay equipment is connected to the switchboard by field wire or cable. Telephone and teletype communication may be used with this equipment. See figure 25 for a typical use of radio relay equipment.

b. Radio relay communication is particularly desirable in situations where construction of wire lines is either difficult or impossible. It requires time for installation and cannot be used when the command post is moving. Use of this equipment is coordinated with the construction and use of field wire lines.

134. LIAISON, DIVISION HEADQUARTERS. a.

All units directly under command of the division maintain liaison officers at the division command post. The division, in turn, dispatches liaison officers to higher headquarters and to the headquarters of adjacent units. A liaison officer is a direct representative of his commander. Although he carries messages between his headquarters and the division command post, he is not, in any sense of the word, a messenger. Liaison officers report to the chief of staff upon their arrival.

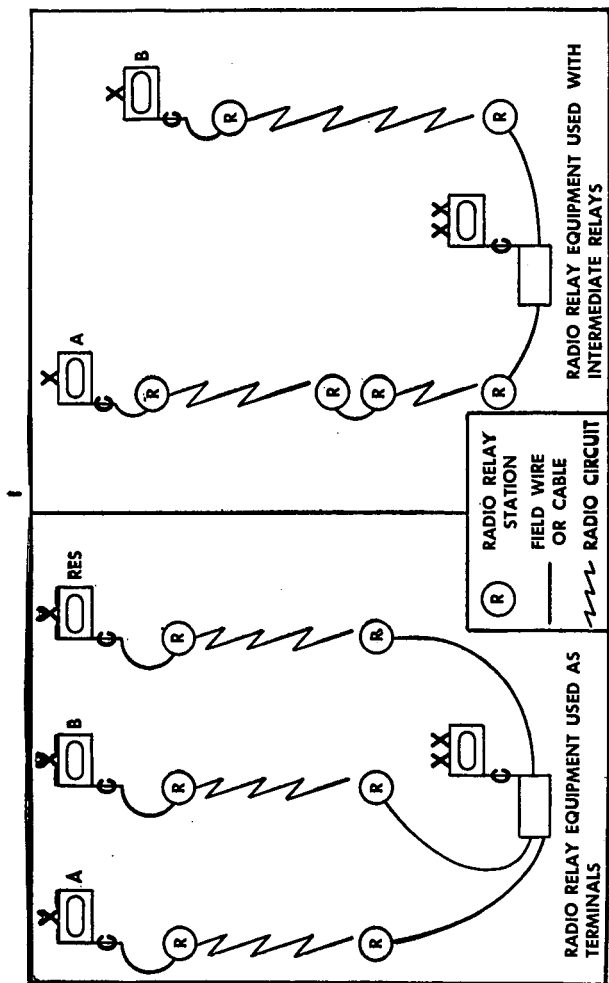


Figure 25. Typical use of radio relay equipment.

b. The division signal officer must maintain close liaison with the general and special staff. Both he and his assistants should make frequent staff visits to the units under division control, as well as to higher headquarters. Close liaison and cooperation between all communication personnel will pay dividends in better communication.

c. Radio communication to adjacent units is provided by the division liaison net. Wire communication to lateral units is constructed if time permits.

Section III. COMMUNICATION DURING MARCHES AND IN BIVOUAC, ARMORED DIVISION HEADQUARTERS

135. COMMUNICATION DURING MARCHES—GENERAL. During marches, if radio or listening silence is not required, radio will be the principal means of communication. Messenger and visual communication will be used to supplement radio communication. When radio or listening silence is in effect, messengers will be the principal means of communication. Radio relay cannot be used on the march. However, when practicable, it will be installed at the next location to be operative when the command post enters the new area. Wire rarely is used except when existing field wire lines or commercial wire lines parallel the route of march.

136. RADIO COMMUNICATION DURING MARCHES, DIVISION HEADQUARTERS. When the situation

permits, radiotelegraph nets operate during the march, and all voice radio sets listen on the headquarters net. Transmissions are kept to the minimum necessary for march control and inter-staff communication. If secondary stations are separated beyond the transmission range of radio sets, provision must be made for relay stations. During periods of listening silence, all operators listen on their proper channels, but no transmissions are made until the listening silence is lifted.

137. MESSENGER COMMUNICATION DURING MARCHES, DIVISION HEADQUARTERS.

Mounted messengers are detailed to follow staff sections in order to provide messenger service (fig. 26). Scheduled messenger runs will be maintained whenever possible. The message center vehicle will be marked plainly so that incoming messengers can locate it quickly during either daylight or darkness.

138. VISUAL COMMUNICATION DURING MARCHES, DIVISION HEADQUARTERS.

Whenever possible, arm and hand signals are used for column control in preference to radio transmission. Vehicular panels are displayed as designated by the division SOI. Pyrotechnic and smoke signals are maintained in readiness for instant use. Both panels and pyrotechnic signals will be especially useful for identification to friendly aircraft.

139. COMMUNICATION IN BIVOUAC, DIVISION HEADQUARTERS—GENERAL.

Although radio is the principal means of communication in the armored

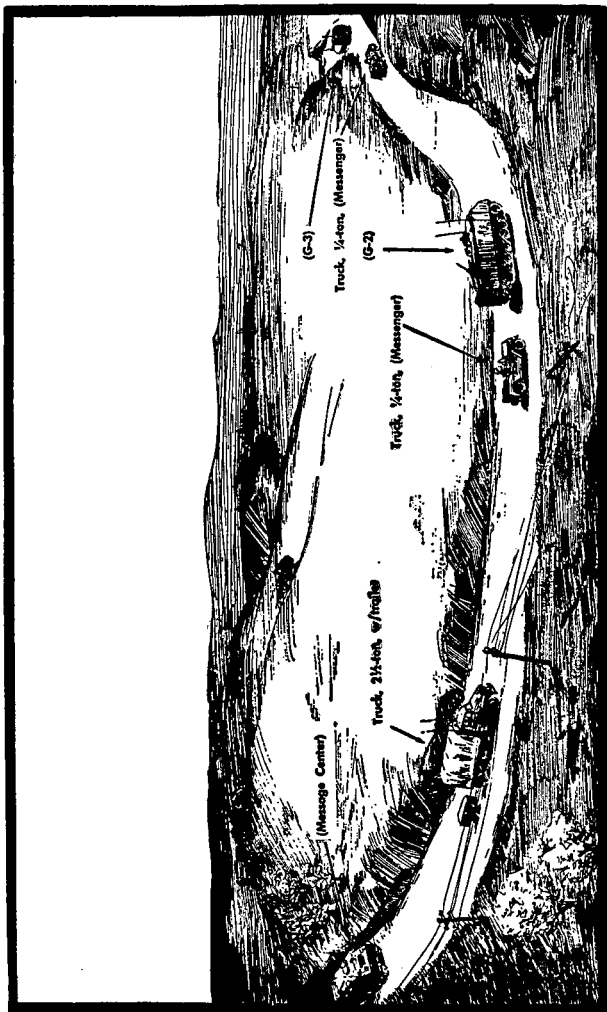


Figure 26. On the march, mounted messengers are detailed to follow staff sections in order to provide messenger service.

division, supplementary means of communication are exploited to the utmost in bivouac, in order to give personnel a rest and to replace and repair radio equipment. Operating personnel are used in shifts in order to equalize the work load and still maintain adequate service for the command post. The message center is established at a location in the command post where it can be reached easily from the road net and is convenient to the staff.

140. RADIO COMMUNICATION IN BIVOUAC, DIVISION HEADQUARTERS. a. To prevent enemy location of the headquarters and to increase security, radio sets should not be used for communication between vehicles in the same bivouac area. The headquarters net is used for intercommunication between echelons of division headquarters.

b. Radio stations in corps or other higher headquarters radio nets operate as directed by the net control stations. These radio nets usually operate continuously.

c. Full use is made of remote control systems. Each staff radio set is remotored to the working space assigned that section within the command post. Radio sets and remote control equipment are utilized so that the minimum personnel are required for operation. Radio operators will be particularly careful in the use of loudspeakers. Unless discipline is maintained in this matter, a radio can be located easily from a distance by the sounds emanating from its loudspeaker.

141. MESSENGER COMMUNICATION IN BIVOUAC, DIVISION HEADQUARTERS. Messenger service operates under the direction of the message center officer. Both scheduled and special messenger service is maintained. Local messengers may be designated for the delivery of incoming messages.

142. WIRE COMMUNICATION IN BIVOUAC, DIVISION HEADQUARTERS. Wire communication is established whenever the situation permits. One or more trunk lines are constructed to major subordinate units. Higher headquarters will construct wire lines to the division. Radio link communication to higher and lower headquarters is established whenever possible. Local lines are constructed to meet minimum requirements.

Section IV. PREPARATION FOR THE ATTACK, ARMORED DIVISION HEADQUARTERS

143. PLANNING FOR COMMUNICATION. a. An adequate and efficient communication system requires not only adequate equipment and personnel, but also thorough and constant planning. The division signal officer is kept informed of all current operations and joins with the commander and other staff members in planning for future operations. Details pertaining to communication are coordinated with higher, adjacent, and subordinate units. Plans are made to include all contingencies. Primarily, the plan is built upon the concept of success in the attack. Alternate means of com-

munication are provided, particularly to critical positions and units.

b. Once a plan has been adopted, all concerned must be well briefed in its operation. Each section, team, and individual concerned must understand fully the mission and the procedures to be used to accomplish it.

144. DIVISION SIGNAL ORDERS—GENERAL. The several orders which concern communication activities within the armored division are the standing operating procedure (SOP), standing signal instructions (SSI), signal operation instructions (SOI), signal order, and paragraph 5 of the operation order. The signal mission is to provide the commander with the necessary communication to enable him to carry out his assigned tactical mission successfully, expeditiously, and economically.

145. DIVISION PLAN OF SIGNAL COMMUNICATION. The plan of signal communication is the statement of the division signal officer to the division commander informing him of the steps he intends to take to accomplish the signal mission. When this plan has been approved by the commander or his proper representative, it is used as the basis for paragraph 5 of the commander's operation order.

146. PARAGRAPH 5 OF DIVISION OPERATION ORDER. The purpose of this paragraph is to convey to subordinate units essential information relative to signal communication. This information should include—

a. Signal annex or index to SOI.

b. Command posts and axes of signal communication.

c. Advance message centers and march control posts.

147. SIGNAL ANNEX TO DIVISION OPERATION ORDER. This annex amplifies paragraph 5 of the operation order. Normally, it is issued only during the initial phases of an operation. It may be issued in fragmentary form. Further, this annex is based partially on the signal annex to the operation order of the next higher headquarters. (See FM's 24-16 and 101-5.)

148. DIVISION SIGNAL OPERATION INSTRUCTIONS (SOI). Signal operation instructions are a type of combat order which affects the employment of signal communication troops and agencies. They are subject to frequent change. These instructions include the following general items:

- a. Codes and authentication tables.
- b. Settings for Converter, M209.
- c. Panel, smoke, and pyrotechnic signals.
- d. Radio call signs and frequencies.
- e. Telephone directory.
- f. Teletypewriter call signs.

149. DIVISION STANDING SIGNAL INSTRUCTIONS (SSI). These are instructions which affect the employment of signal communication troops and agencies, and are not changed often. These instructions include the following general items:

- a. Distribution.

- b. Authentication systems.
- c. Information concerning codes in the SOI.
- d. Instructions for use of the SOI.

150. DIVISION STANDING OPERATING PROCEDURE (SOP).

The standing operating procedure is a set of uniform standardized procedures and techniques established by a commander as a guide for the performance of all contemplated operations capable of standardization without loss of efficiency. The signal section of the division SOP is prepared by the signal officer. The purposes of standing operating procedures are to gain time through standardizing methods, procedures, and techniques; to reduce the number and length of operation orders; to simplify and perfect training; and to simplify the commander's orders. Standing operating procedures should not be long and cumbersome. Proper formulation and utilization of an SOP will minimize the need for signal annexes and will reduce the number of additional signal instructions so that they can be included in paragraph 5 of the operation order. (See FM 24-16.)

151. DIVISION LIAISON DURING PREPARATION FOR THE ATTACK.

The details of planning for the attack should be coordinated by personal contact between the division signal officer or his representative and the signal and communication officers of higher, adjacent, and subordinate units. This type of coordination is especially desirable when a nondivisional unit has been attached to the division. In all cases, it is imperative that units have

the latest signal operation instructions and are familiar with them. Care must be taken to insure that the radio equipment of nondivisional units will net with that of the divisional units.

152. RADIO COMMUNICATION DURING PREPARATION FOR THE ATTACK, DIVISION HEADQUARTERS.

Available radio equipment and personnel are checked against the requirements for radio communication. As far as practicable, the signal plans are made to conform to the tactical plans. If the radio facilities of the division are not adequate to carry out the tactical plan from a signal point of view, arrangements must be made to procure additional equipment and personnel from higher headquarters. Because of the great number of radio nets in the armored division, it is imperative that all radios operate on the proper frequency. To accomplish this, all nets should be put into operation prior to an actual operation, whenever the situation and security permit.

153. WIRE COMMUNICATION DURING PREPARATION FOR THE ATTACK, DIVISION HEADQUARTERS. a.

Wire communication is particularly valuable during the planning stage and up to the actual time of the attack. Except when the attack is for a limited objective, wire communication with subordinate units often is lost during the attack, because of their rapid movement. Every effort is made to maintain wire communication with the combat commands during the attack. The absence of wire will not preclude the movement of headquarters.

b. Plans for the use of wire must be made carefully. Whenever practicable, a route reconnaissance is made of each possible route to determine which is most suitable for wire. Wire lines must be constructed carefully so that vehicles cannot destroy them once the attack has commenced.

154. RADIO RELAY COMMUNICATION DURING PREPARATION FOR THE ATTACK, DIVISION HEADQUARTERS. Radio relay communication normally will be established between the division and higher headquarters and between the division and the combat commands. Extreme care must be taken to prevent the enemy from locating the relay stations.

155. DIVISION SIGNAL SUPPLY AND MAINTENANCE DURING PREPARATION FOR THE ATTACK. a. Maintenance of signal equipment is continuous but is intensified during the preparation for the attack. All equipment is checked, and defective equipment is repaired or replaced. One light radio repair team normally will be in the division command post area to perform organizational maintenance. A heavy radio repair team, equipped to perform field maintenance, may be located at a central location, or it may be scheduled to move from unit to unit, in a certain area, to make inspections and repairs.

b. Adequate signal supplies are obtained prior to the attack. Expendable items must be available to cover the probable period of the attack.

156. DIVISION PHOTOGRAPHIC TEAMS DURING PREPARATION FOR THE ATTACK. The photographic

teams of the armored signal company operate under the control of the division signal officer to provide all elements of the division with proper coverage. At least one team normally will remain in the division command post area. This team will be capable of taking both still and moving pictures and, to a limited extent, aerial photos from liaison planes.

157. DIVISION COMMAND POST DURING PREPARATION FOR THE ATTACK. The division command post is located well forward in order to avoid displacement during the early stages of the attack. All radio vehicles are placed in position and camouflaged. Care is taken to insure that trees and overhanging branches do not come in contact with antennas. Radio operators and message center personnel who are to accompany the command group must be alerted and briefed. Plans must be made to provide radio and messenger communication between the command group and the forward echelon. The arrangements made for communication between the forward and rear echelons are more elaborate; in addition to radio contact between these two echelons, wire circuits may be constructed and teletypewriters installed.

Section V. COMMUNICATION DURING THE ATTACK, ARMORED DIVISION HEADQUARTERS

158. GENERAL. During the attack, radio is the principal means of communication. All other available means of communication are used to supple-

ment radio or to replace it during periods of listening silence.

159. DIVISION HEADQUARTERS DURING THE ATTACK. a. During the attack, contact between the echelons of division headquarters must be maintained at all times.

b. The principal means used between the forward echelon and the command group is radio, which is supplemented by messenger. Wire will be utilized to a considerable extent during the preliminary stages of the attack, but normally will be impractical once the attack has commenced, inasmuch as the command group is highly mobile and probably will not remain in one location long enough to justify the installation of a wire circuit.

c. Communication between the forward and rear echelons will be maintained primarily by radio and radio relay. However, wire may be utilized.

d. The communication center will operate at the forward echelon, but necessary messengers and code clerks will be attached to the command group.

160. DIVISION LIAISON DURING THE ATTACK. a. Liaison is maintained by sending liaison officers to higher and adjacent units. All units directly under division control send liaison officers to the division command post. Liaison officers are not provided for the exclusive use of any one staff section; they are under the supervision of the chief of staff and are made available to all sections of the division headquarters.

b. Each liaison officer is provided with a radio-equipped vehicle. Liaison officers from subordinate units may be either in the net of their own unit or in the division headquarters net. Liaison officers to adjacent units are in the division liaison net. The division liaison officer to higher headquarters may be provided with a radio-equipped vehicle from the division signal company to operate in the division liaison net. Liaison officers make use of all available means of communication to accomplish their mission.

161. RADIO COMMUNICATION DURING THE ATTACK, DIVISION HEADQUARTERS.

a. Maximum use is made of radio in the attack. Frequently, the attack will commence under listening silence, which is maintained until enemy contact is made. During listening silence, all radio sets are manned and ready for immediate operation, and all receivers are monitored. Efficient radio communication under these circumstances demands the highest degree of discipline and alertness from all concerned.

b. Encrypted messages are used when necessary, but the bulk of voice radio messages will pertain to the enemy or to immediate action and will be sent in the clear. Whenever possible, alternate frequencies are made available for use in case of enemy jamming or other interference.

c. Whenever the commander or staff officers leave the command post, they maintain radio communication with the command post.

162. WIRE COMMUNICATION DURING THE ATTACK, DIVISION HEADQUARTERS. Wire communication is maintained until the division command post moves. Whether or not wire is to be installed or extended during or after the movement is dependent upon the tactical situation. It is not practicable to attempt to install wire when command posts are making frequent and rapid moves. Every effort is made, however, to maintain wire communication between the forward echelon, the combat commands, and the rear echelon.

163. RADIO RELAY COMMUNICATION DURING THE ATTACK, DIVISION HEADQUARTERS. During the attack, wire communication may be interrupted by frequent moves of headquarters and by the destruction of wires by enemy fire and friendly vehicles. To reduce the effect of these interruptions to the absolute minimum, radio relay communication should be established between the division and the combat commands. When the division command post is about to displace, the radio relay teams are moved rapidly to the new location to reestablish radio relay communication with the combat commands prior to the arrival of the command post at the new site (fig. 27).

164. DIVISION SIGNAL SUPPLY AND MAINTENANCE DURING THE ATTACK. During the attack, the division signal supply element will be prepared to issue supplies and equipment to cover losses. The signal supply element is located with the division headquarters rear echelon; however, an advance signal

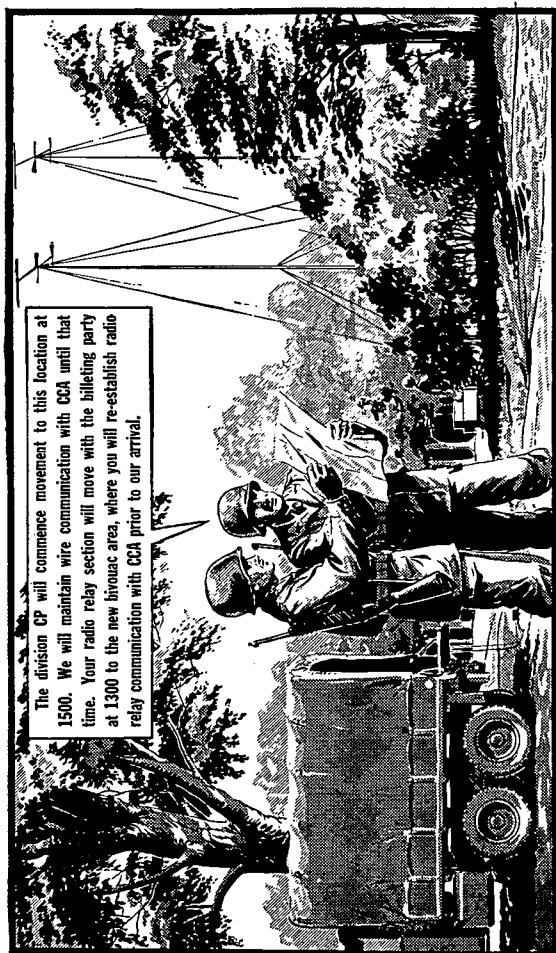


Figure 27. When the division command post displaces, the radio relay teams are moved rapidly to the new location to reestablish communication.

supply dump may be established in the vicinity of the forward echelon. All units should have on hand sufficient expendable supplies to carry them through several days of combat. When ordnance maintenance companies are in support of or attached to combat commands, one heavy radio repair team normally will be attached to each ordnance company. Each of these radio repair teams will be capable of issuing a limited amount of expendable supplies to the combat commands. They will have on hand a limited number of spare radio sets for direct exchange of inoperative radio sets which cannot be repaired in a reasonable period of time. When the ordnance companies are retained under centralized control in an ordnance area, radio repair teams may be attached to them. It may be desirable to retain the radio repair teams under centralized control in a signal area, or it may be desirable to attach the radio repair teams directly to the combat commands. In the latter case, the teams normally would be located in the combat command trains area.

Section VI. COMMUNICATION DURING REORGANIZATION AND DURING EXPLOITATION, ARMORED

DIVISION HEADQUARTERS

165. COMMUNICATION DURING REORGANIZATION.

During the reorganization, all means of communication used during the attack are continued in operation. The signal officer effects repairs and improvements in the communication system; and

makes recommendations for changes incident to the next operation. Every effort is made to repair or replace faulty communication equipment and to resupply such items as wire and batteries. This is a very critical period during an operation; every commander must have uninterrupted communication. During this period, certain units may be detached from one command and attached to another. It is particularly important that signal and communication officers be kept informed fully of any projected or actual change in task organization so that they can plan and establish the new communication system.

166. COMMUNICATION DURING EXPLOITATION. Radio is the principal means of communication employed during the exploitation. Communication must be positive and flexible in order that necessary changes may be made rapidly to fit the immediate situation.

167. DIVISION LIAISON DURING EXPLOITATION. Liaison is employed during the exploitation as the situation requires. During the exploitation phase, the duties of liaison officers become more difficult to perform. Information as to the locations of units may be lacking, vague, or incorrect. Distances are likely to be greater than in any other phase. Scattered groups of enemy who have been cut off may interfere with individual unarmored vehicles. It may be necessary to furnish liaison officers with armored vehicles or liaison planes for transportation.

168. RADIO COMMUNICATION DURING EXPLOITATION, DIVISION HEADQUARTERS. Full use of radio communication is made during the exploitation phase. When distances between units become great, provision is made for relay stations to maintain communication. During this phase, it will not be uncommon for the armored division to supply the combat commands with high-power radio sets from the division or higher headquarters. When it is not feasible to send heavy equipment to the combat or reserve command, liaison planes may be employed for courier service or may act as intermediate relay stations for voice transmissions. This equipment may have to be diverted from its normal assignment. Appropriate protection must be furnished unprotected radio stations.

169. RADIO RELAY COMMUNICATION DURING EXPLOITATION, DIVISION HEADQUARTERS. Care must be exercised to make certain that radio relay teams are not being sent into territory not clear of enemy. If any doubt exists, protection should be provided for them.

170. DIVISION COMMAND POST DURING EXPLOITATION. The command post normally operates on the move during exploitation. Signal personnel operate in shifts, even during marches, so that necessary relief may be obtained. Movement and use of messengers are controlled carefully to prevent their movement in areas not clear of enemy troops. They are used laterally between marching columns only as a last resort.

Section VII. PREPARATION FOR THE DEFENSE AND COMMUNICATION DURING THE DEFENSE, ARMORED DIVISION HEADQUARTERS

171. PLANNING FOR COMMUNICATION. The signal communication system is planned to support the tactical plan. The system must be designed so that it will not be disrupted by enemy attack or fires. The employment of the armored division in the defense often will require the use of more wire equipment than normally is authorized. Planning should include the actions necessary to obtain the additional equipment required for this type of operation.

172. COMMUNICATION DURING THE DEFENSE—GENERAL. **a.** The armored division is capable of conducting either a sustained or a mobile defense. The sustained defense is the conventional type of defense for all elements other than armored. It aims at maintaining the integrity of the battle position by organizing that position and holding it at all costs. Covering forces are employed to delay and disorganize the advance of the enemy and to deceive him as to the true location of the battle position. The mobile defense is the type of defense that is best suited to armor. This type of defense does not visualize the holding of a line; it permits more elasticity in the use of mobility and terrain. In the mobile defense, it is planned to maneuver, to counterattack, and to trap and destroy the enemy. Communication during a sustained defense will be characterized by an extensive wire system,

while communication during a mobile defense will be characterized by less use of wire and greater use of radio.

b. The communication system for the mobile defense will be similar to the system used in the attack, with the exception that provision is made for operation with restricted use of radio or under radio or listening silence. The signal officer maintains close liaison with the division staff and the signal officer at higher headquarters. He obtains early information about major changes in the tactical situation and in the commander's plan, in order to determine the need for additional equipment and supplies to carry out that plan.

173. RADIO COMMUNICATION DURING THE DEFENSE, DIVISION HEADQUARTERS. Except during periods of actual combat, radio transmissions usually are restricted, or stations operate under listening silence. The radio system must be ready at all times for instant operation, particularly during an enemy attack or when other means of communication fail. Whenever possible, radio sets should be located in covered positions and remote control used to permit operation from convenient sheltered positions.

174. WIRE COMMUNICATION DURING THE DEFENSE, DIVISION HEADQUARTERS. a. Initially, a wire system similar to that used prior to the attack will be installed. As time permits, this wire system will be expanded to include—

(1) Alternate lines to combat commands and

other units directly under division control.

(2) Lateral lines to adjacent units.

(3) Lateral lines between subordinate units.

b. Installations and lines are constructed to restrict damage by enemy artillery fire. This can be accomplished by burying lines and digging in switchboards and teletype machines. Alternate means of communication must be provided to maintain communication during any temporary disruption of the system by heavy fire.

175. DIVISION RADIO RELAY STATIONS DURING THE DEFENSE. Radio relay stations are located in positions which provide adequate communication, and yet prevent enemy ground or air observation. To minimize enemy interception, the radio relay stations are placed, whenever possible, so that a land mass is located between them and the enemy lines.

CHAPTER 4

COMBAT COMMAND AND RESERVE COMMAND

Section I. GENERAL

176. MISSIONS. a. Headquarters, combat command. This headquarters contains the necessary command and staff personnel for command, control, and supervision of a tactical grouping of combined arms.

b. Headquarters, reserve command. This headquarters contains the necessary command and staff personnel for command, control, and supervision of combat elements of the division not attached to combat commands, and rehabilitation of units withdrawn from combat.

177. SIGNAL OPERATION INSTRUCTIONS (SOI), COMBAT OR RESERVE COMMAND. Signal operation instructions are prepared by the division signal officer and issued to subordinate units. During combat operations, the communication officer of the combat or reserve command will receive the items of signal operation instructions for the entire command and arrange distribution to the attached units. The division signal officer prepares sufficient copies of each item of the SOI so that

preparation of extracts is not necessary at subordinate headquarters.

178. ORDERS OF THE COMBAT OR RESERVE COMMAND COMMUNICATION OFFICER. After completing and obtaining approval of his plan of communication, the communication officer issues the necessary orders to his communication assistant, communication chief, and section chiefs. These orders usually are oral. An operation map, overlay, or sketch is helpful. When communication personnel are well-trained and have a standing operating procedure, the communication officer's instructions may be limited to an announcement of the location of command posts, the general plan of communication, and such special instructions as may be necessary.

179. STANDING OPERATING PROCEDURE (SOP), COMBAT OR RESERVE COMMAND. The unit standing operating procedure sets forth the organization of the headquarters and headquarters company for tactical purposes and prescribes procedures for the various sections. The communication officer will prepare the communication section of the SOP. The amount of detailed instructions will depend on the desires of the commander, the status of training in the unit, and the equipment available.

Section II. ORGANIZATION, COMBAT COMMAND AND RESERVE COMMAND

180. GENERAL. There are two combat commands and one reserve command in the armored division.

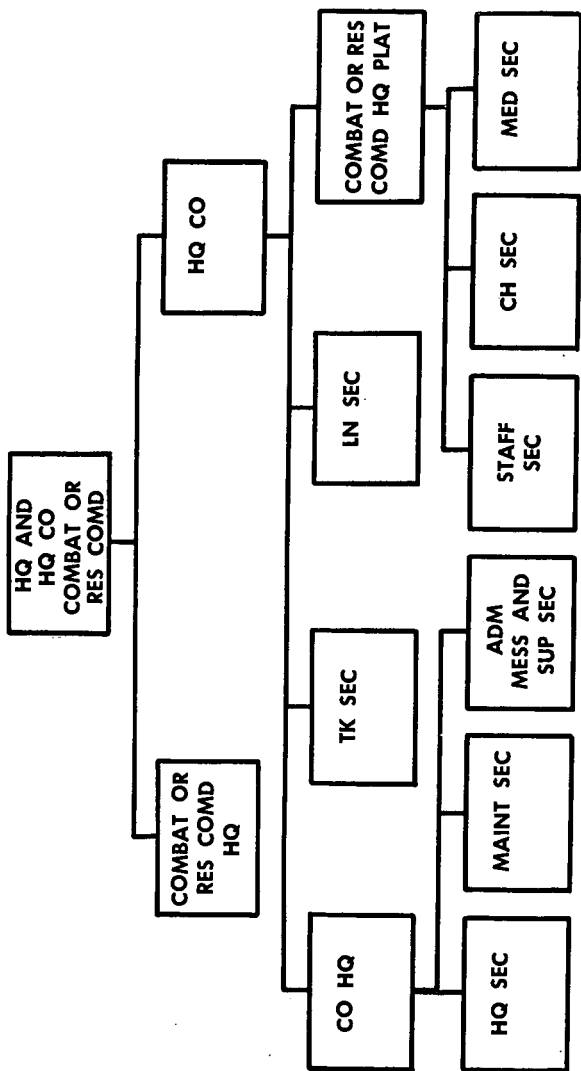


Figure 28. Organizational chart, headquarters and headquarters company, combat or reserve command.

The only organic unit in the combat command or reserve command is the headquarters and headquarters company. The detailed organization of the combat command and reserve command headquarters and headquarters company is prescribed by T/O&E 17-20-1N. Major elements of the headquarters and headquarters company are shown in figure 28.

181. MEANS OF COMMUNICATION EMPLOYED BY THE COMBAT OR RESERVE COMMAND. Radio is the principal means of communication and is employed extensively throughout the combat and reserve commands. Wire communication supplements radio. During periods of listening silence or during sustained defensive operations, wire may become the principal means. Regardless of the type of operation, messenger communication is used whenever possible. Sound and visual communication are auxiliary means which may be employed to transmit short prearranged messages.

182. COMBAT OR RESERVE COMMAND RADIO EQUIPMENT. *a.* The command's radio equipment consists of radio sets and associated equipment, together with the equipment necessary for organizational maintenance and repair of radio sets. Two general types of radio sets are employed—

- (1) Medium-power vehicular radiotelegraph-telephone (amplitude-modulated) sets provide communication between the—
 - (*a*) Combat or reserve command, higher headquarters, and adjacent units.

- (b) Combat or reserve command and attached units.
- (2) Medium- or low-power vehicular radio-telephone sets provide communication between—
 - (a) Echelons, vehicles, and staff sections of the headquarters and headquarters company.
 - (b) The unit headquarters and attached or supporting units.
 - (c) The unit headquarters and adjacent units.
 - (d) The unit headquarters and aircraft.

b. Radio operators are authorized for the medium-power radiotelegraph-telephone radio sets. The medium- and low-power voice sets are operated by personnel, usually officers, of the section concerned.

183. COMBAT OR RESERVE COMMAND WIRE EQUIPMENT. a. The command's wire equipment consists of switchboards, telephones, field wire, and sufficient wire-laying devices to install local telephones.

b. Wire communication is established between higher headquarters and the combat or reserve command headquarters forward echelon (command post), and between the command post and attached units, as time and the situation permit. The unit is authorized switchboard equipment and operating personnel. Certain organic messengers also are designated as linemen in addition to their primary duties.

c. Providing an adequate wire communication

system requires attachment of a wire construction team from the armored signal company. In addition, a radio relay team and a teletype team normally are attached to augment communication to higher headquarters.

d. When attachments from the armored signal company are made as listed above, the combat command or reserve command would have available, situation permitting, the following wire communication:

- (1) To higher headquarters: telephone, using wire circuits and/or radio relay circuits; and teletypewriter, using wire circuits and/or radio relay circuits.
- (2) To attached subordinate units: telephone.

184. COMBAT OR RESERVE COMMAND MESSENGER COMMUNICATION—GENERAL. Messengers mounted in $\frac{1}{4}$ -ton trucks are provided. They are used for both scheduled and special messenger runs and may be used mounted or dismounted.

185. COMBAT OR RESERVE COMMAND VISUAL COMMUNICATION — GENERAL. The visual equipment consists of panels, flags, lamps, and pyrotechnics. Panels are of two types: vehicle identification panels and signaling panels. Pyrotechnics include ground signals and smoke and are used primarily for identification to friendly forces, both ground and air.

186. COMBAT OR RESERVE COMMAND SOUND COMMUNICATION—GENERAL. Sound signaling is used

chiefly to attract attention, and to give the alarm of gas, air, or mechanized attack, by whistles, bugles, sirens, klaxons, small-arms fire, or other sound-making devices.

187. PHOTOGRAPHIC FACILITIES AVAILABLE TO THE COMBAT OR RESERVE COMMAND. A photo team may be attached, for specific missions, from the armored signal company. For further information as to the team's organization, capabilities, and limitations, see paragraph 69.

188. COMBAT OR RESERVE COMMAND COMMUNICATION PERSONNEL—GENERAL. Tables of organization and equipment provide, for the headquarters and headquarters company, combat or reserve command, personnel whose primary duties are those of communication. Personnel whose communication duties are secondary to their other duties are provided also.

189. DUTIES OF COMBAT OR RESERVE COMMAND COMMUNICATION OFFICER. a. The communication officer is a member of the commander's staff and, as such, makes recommendations for technical and tactical employment of the signal communication facilities.

b. He is charged with establishing, operating, and maintaining the combat or reserve command communication systems.

c. He supervises so much of the technical training of communication personnel throughout the command as may be delegated to him by the commander.

d. He submits plans and recommendations for establishing a system of signal communication throughout the command.

e. He is charged with the technical supervision of the signal communication system, to include maximum coordination within the combat or reserve command and between it and adjacent, supporting, and higher units.

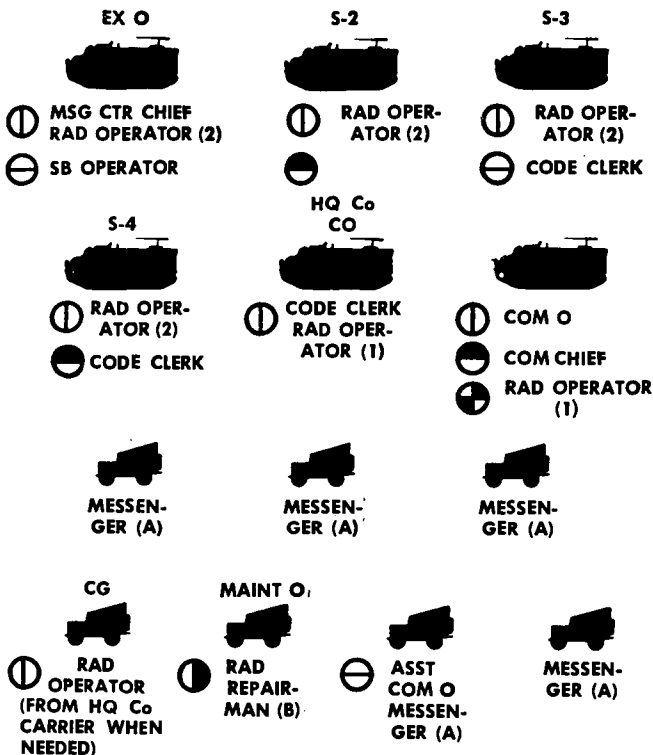
f. He submits recommendations for matter covered in paragraph 5 of the operation order.

g. He prepares or obtains from higher headquarters such orders and signal operation instructions as may be needed to insure tactical and technical control of the signal communication system of his unit, and distributes these orders and signal operation instructions throughout his unit and attached units.

h. He furnishes technical advice and assistance to S-4 regarding the supply of signal communication material.

i. He acts as assistant S-3 Air in addition to his other duties. As such, he gives advice to the commander and other staff officers on air matters, and submits plans and makes recommendations for the employment of supporting aircraft. He supervises so much of the air-ground training within the combat or reserve command as may be delegated to him by the commander.

190. DUTIES OF COMBAT OR RESERVE COMMAND ASSISTANT COMMUNICATION OFFICER. The assistant communication officer performs such duties as the communication officer prescribes. He super-



- ① RADIO SET, SCR-506.
- ⊖ RADIO SET, SCR-508.
- ⊖ RADIO SET, SCR-528.
- ⊖ RADIO SET, SCR-510.
- ⊕ RADIO SET, AN/ARC-3.

- A. DRIVES TRUCK, 1/4-TON; ALSO LINEMAN, 641.
- B. DRIVES TRUCK, 1/4-TON.

NOTE: ONLY VEHICLES USED BY COMMUNICATION PERSONNEL ARE SHOWN ON THIS CHART.

Figure 29. Typical loading plan for organic communication personnel.

vises the execution of the orders of the communication officer and, in the latter's absence, assumes his duties.

191. DUTIES OF OTHER COMBAT OR RESERVE COMMAND COMMUNICATION PERSONNEL. a. The communication chief is the principal enlisted assistant to the communication officer.

b. The message center chief establishes and operates the unit message center under the direction and supervision of the communication officer.

c. Radio operators, repairmen, code clerks, and other specialists perform technical duties in conformity with prescribed procedures, and such other duties as may be prescribed by the communication officer. General duties of all communication personnel are covered in paragraphs 6-13.

d. Figure 29 shows a typical loading plan for organic communication personnel.

192. ATTACHMENTS TO COMBAT OR RESERVE COMMAND FROM ARMORED SIGNAL COMPANY. During combat operations, signal personnel normally will be furnished by the armored signal company to provide additional communication facilities as required. They may include radio operation teams, wire construction teams, radio repair teams, radio relay operation teams, and teletype operators. (See ch. 2.)

Section III. ORGANIZATION FOR COMBAT, COMBAT OR RESERVE COMMAND

193. GENERAL. Within the combat command, the

units ordinarily are organized into combined arms teams consisting basically of tanks, armored infantry, and armored engineers. These combined arms teams, operating under the combat command, are reinforced battalions, commanded by the battalion commanders of the tanks and armored infantry battalions. The reinforced battalions are formed by the attachment of tanks from a tank battalion to an armored infantry battalion, or of armored infantry from an armored infantry battalion to a tank battalion. Armored engineer detachments may be attached to or placed in support of both types of reinforced battalions. The ratio of tanks and armored infantry varies in these reinforced battalions. One may be strong in tanks while another may be strong in armored infantry, but the basic principle of employing tanks and armored infantry together is adhered to closely. Artillery battalions may be attached to or placed in support of the combat command. Artillery battalions seldom are attached to reinforced tank or armored infantry battalions but are designated as direct-support battalions for them. Reconnaissance and service elements attached to the combat command normally operate under direct control of the combat command headquarters.

194. ORGANIZATION FOR COMBAT, COMBAT OF RESERVE COMMAND HEADQUARTERS. a. The combat command headquarters and headquarters company, like the division headquarters and headquarters company, operates in two echelons, forward and rear, with a command group frequently operating out of the forward echelon.

b. The communication personnel of the headquarters and headquarters company are not organized into a communication unit but are assigned to various sections. The enlisted communication personnel may perform their duties in the various sections under the technical supervision of the communication officer, or may operate directly under the communication officer. Attached signal personnel will operate directly under the communication officer.

195. COMBAT OR RESERVE COMMAND LIAISON—GENERAL.

a. The combat or reserve command maintains liaison with higher and adjacent headquarters. This liaison is accomplished by sending liaison officers to these units. Attached and supporting units will send liaison officers to the combat or reserve command headquarters. Each of these liaison officers normally is mounted in a $\frac{1}{4}$ -ton truck, equipped with a voice radio set.

b. The communication officer maintains personal liaison with the division signal officer and the communication officers of attached and adjacent units. He should have both his assistant and his communication chief make liaison trips whenever the situation permits. Close liaison and cooperation between all communication personnel is essential.

c. Means of lateral communication should be established, whenever possible, for additional liaison and alternate means of communication.

196. COMBAT OR RESERVE COMMAND COMMAND POST—GENERAL. At the command post are the commander and his staff officers and their repre-

sentatives, special staff officers as required, and the enlisted personnel required for its operation. (See par. 25 and 26 for factors to be considered in selecting a command post.) If not prescribed by higher authority, the location of the combat or reserve command command post is prescribed by the commander. Recommendation for its general location is made to the commander by the S-3, following consultation with the communication officer. An officer designated as the headquarters commandant, accompanied by the communication officer or his assistant, selects the exact site in the general vicinity of the designated point.

197. INTERIOR ARRANGEMENT, COMBAT OR RESERVE COMMAND COMMAND POST.

a. Installations within the command post should be separated by at least 50 yards to minimize the damage that might be caused by a single shell or bomb.

b. The message center is located where it easily can be seen and reached by incoming messengers and other personnel without interference with other command post installations.

c. Locations of vehicles within the command post established in the field normally are indicated by the unit standing operating procedure. When the command post is established in buildings, the radio-equipped vehicles are located near the staff sections, or the radio sets are operated from the staff sections by use of remote control systems.

d. The switchboard is installed in a location convenient to incoming wire circuits and affording as much cover, shelter, and freedom from interfer-

ence and noise as possible. Telephones are installed as required. The communication officer will establish a priority for the installation of local circuits. The number of telephones installed should be kept to a minimum. Several telephones are kept on hand for test purposes and for establishing service at the new command post during displacement.

198. OPERATION, COMBAT OR RESERVE COMMAND COMMAND POST.

a. The command post is organized for continuous operation. Staff officers relieve each other and the commander as necessary. Communication teams are organized so that adequate personnel are on duty at all times; shifts are arranged so that personnel receive necessary rest.

b. All personnel of the message center are trained in each duty performed within the team. In stable situations, the message center operates as a team; during moving situations, it is broken up into sections. The message center chief rides in the vehicle of the executive officer, and a code clerk rides in the vehicle of the S-3. Other code clerks are assigned to staff sections as the traffic load and situation require. During moving situations, each member of the message center will keep the necessary records.

c. All incoming messengers first report to the message center. Special messengers are directed to the addressee, who receipts for the message. When leaving the command post, all messengers pick up messages addressed to their own unit.

d. Outgoing written messages usually are sent through the message center. During marches, the

message center representatives with each staff section handle outgoing messages. The use of messengers is coordinated by the message center chief.

e. Scheduled message runs are established. Full use is made of this service so that special message runs are kept to a minimum. Runs are scheduled so that normal administrative reports and messages can be delivered without delay. Special messengers will be designated and used as required.

f. Officers see that a synopsis of each message sent or received orally, by telephone or by voice radio, is entered in the unit or staff journal.

199. CONDUCT OF PERSONNEL IN COMBAT OR RESERVE COMMAND COMMAND POST. Personnel of the command post are required to perform their duties quietly and in an orderly manner. They are not permitted to loiter in the vicinity of the message center, the switchboard, radio stations, or other command post installations where their presence will create confusion, congestion, or distraction of operating personnel. They are warned against movement which might disclose the command post to enemy observation, and are instructed to avoid making paths or vehicular tracks within the command post area.

200. SECURITY OF THE COMBAT OR RESERVE COMMAND COMMAND POST. The command post is provided incidental security against hostile air and ground forces by front-line units. However, the command post must be provided with a well-planned system of local protection. An officer des-

ignated as the headquarters commandant is charged with providing this security. He uses available personnel of the headquarters company and such other troops as may be detailed for this purpose. Communication personnel normally are not available for duty as guards or sentries, but are organized and trained as part of a reserve to be used in case of actual attack on the command post. For the protection of personnel, fox holes are dug to provide individual protection against air or ground attack. Consideration should be given to locating the command post within the perimeter of the reserve.

201. RADIO COMMUNICATION, COMBAT OR RESERVE COMMAND—GENERAL. Radio is the principal means of communication employed by the combat or reserve command. Sufficient radio personnel and equipment are provided to handle most of the message traffic during fast-moving situations. Radio operators are authorized for the medium-power radiotelegraph-telephone sets; and using personnel, usually officers, operate the medium- and low-power voice radio sets.

202. RADIO COMMUNICATION BETWEEN COMBAT OR RESERVE COMMAND AND HIGHER HEADQUARTERS. The combat or reserve command operates secondary stations in three or more division radio nets. These nets operate principally on radiotelegraph, but may be switched to voice transmission as desired.

a. The *division command net* (fig. 18) is used

for tactical control and command. It handles messages pertaining to tactical operations. The station of the division G-3 is the net control station (NCS). The radio set of the combat or reserve command executive officer is a secondary station in this net.

b. The *division reconnaissance net* (fig. 19) is used for the exchange of messages pertaining to the enemy. The radio station of the division G-2 is the net control station. He is in direct communication with the S-2's of the combat and reserve commands, reconnaissance battalion, and other units, as required.

c. The *division administrative net (forward)* (fig. 20) is used for the purpose of exchanging administrative messages pertaining to supply, evacuation, personnel, and like matters. It provides direct communication between the division G-4 and the S-4's of the combat and reserve commands and other units.

d. The combat or reserve command will operate secondary stations in other division nets when directed to do so. If more than four radio sets are operated in division nets, additional radio sets must be supplied by the armored signal company. Two division radio nets that may be established are—

- (1) The *division air-request net* (fig. 21), which provides instant and direct communication between the assistant G-3 Air of the division and assistant S-3's Air of the combat and reserve commands. This net is used principally for trans-

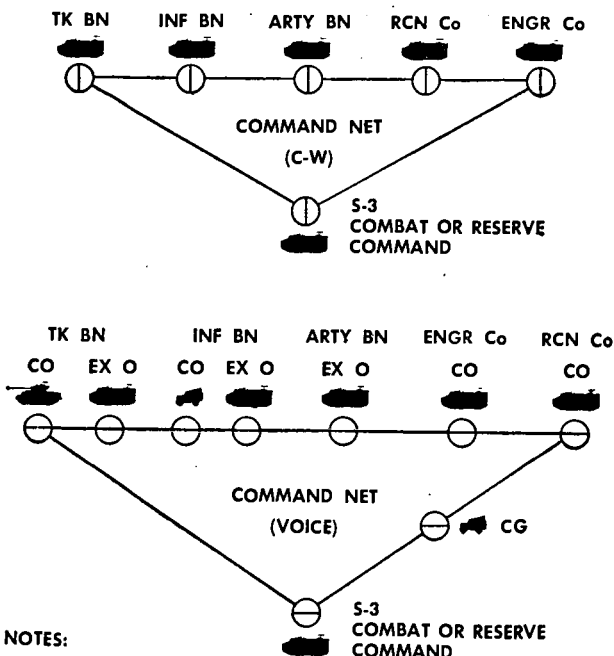
mission of air requests and for the exchange of information pertaining to air-ground operations.

- (2) The *commanding general net* (fig. 22), which provides a direct channel of communication between the division commander and the commanders of units operating directly under division. When established, this net is used for direct personal contact between commanders.

203. COMBAT OR RESERVE COMMAND RADIO NETS.

The combat or reserve command operates three radio nets for communication with subordinate units.

a. The combat or reserve command operates two *command nets* (fig. 30) : one a voice net, the other a radiotelegraph-telephone net. These nets are used for the command and control of subordinate units and for the exchange of information. The voice net is used for direct command during fast-moving situations, particularly when the situation permits the handling of messages in the clear. The radiotelegraph-telephone net is used for cryptographed messages, for written messages that must be copied accurately, and when the voice set is out of range. Both NCS radio stations are located in the vehicle of the S-3. Radio operators are authorized for operation of the radiotelegraph-telephone set, and the voice radio set is operated by personnel of the S-3 section. The commander and staff officers enter the voice command net whenever they desire.

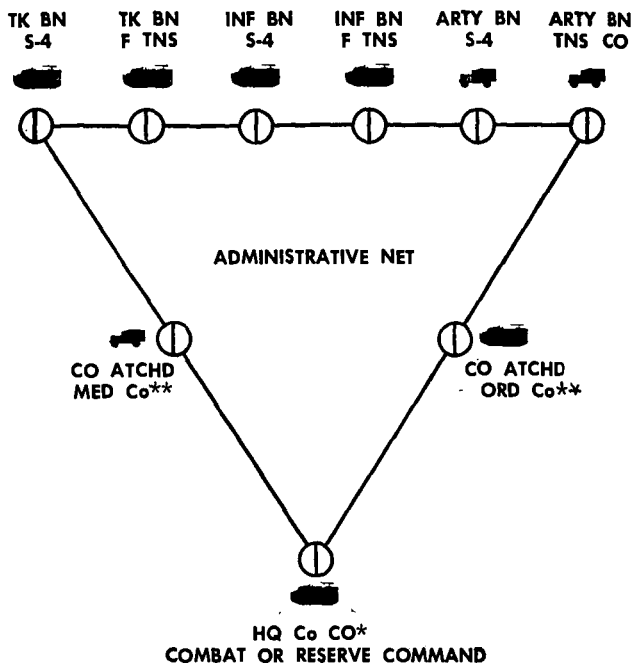


1. UNITS ATTACHED TO THE COMBAT OR RESERVE COMMAND WILL VARY; THIS CHART SHOWS EXAMPLES OF TYPICAL UNITS THAT MAY BE ATTACHED.
2. COMMAND NETS WILL INCLUDE ALL COMBAT UNITS OPERATING DIRECTLY UNDER COMBAT OR RESERVE CONTROL, INCLUDING SUCH UNITS AS ADVANCE OR FLANK GUARDS.
3. STAFF OFFICERS ENTER THE VOICE NET AS REQUIRED.

⊖ RADIO SET, SCR-508

⊕ RADIO SET, SCR-506

Figure 30. Typical radio nets, combat or reserve command command nets.



① RADIO SET, SCR-506.

* RADIO SET LOCATED IN VEHICLE OF CO HQ Co;
OPERATED UNDER DIRECTION OF S-4.

**THESE UNITS MAY AT INTERVALS REPORT INTO THEIR
PARENT BATTALION ON PREARRANGED SCHEDULES TO
HANDLE NECESSARY MESSAGES.

NOTE: UNITS ATTACHED TO THE COMBAT OR RESERVE COMMAND
WILL VARY; THIS TYPICAL NET SHOWS AN EXAMPLE OF
SEVERAL TYPES OF UNITS THAT MAY BE ATTACHED.

*Figure 31. Typical radio net, combat or reserve command
administrative net.*

b. The *combat command administrative net* (fig. 31) provides communication between the combat command S-4 and S-4's of attached battalions. Each tank or armored infantry battalion has two stations in this net: one is located in the vehicle of

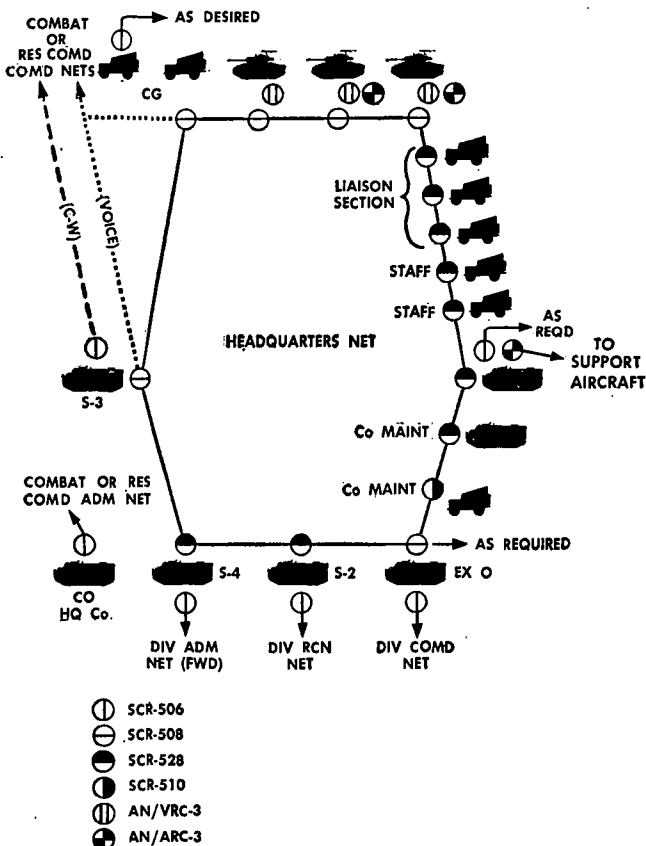


Figure 32. Typical radio net, combat or reserve command headquarters net.

the unit S-4, and the other in the vehicle of its headquarters and service company commander. Since the radio of the headquarters and service company commander is located with the battalion field trains, this net also provides communication between the battalion command post and its field trains.

204. INTERSTAFF RADIO COMMUNICATION, COMBAT OR RESERVE COMMAND HEADQUARTERS. Each armored vehicle and many unarmored vehicles of the headquarters are authorized medium- or low-power voice radio sets. The stations operate together on a combat or reserve command *headquarters net* (fig. 32). The station of the executive officer or the headquarters commandant usually is designated as net control station. This net is used for intercommunication of staff sections and vehicles during marches or for communication between the echelons of the headquarters. It is not used for communication between radio sets in the same area.

205. AIR-GROUND RADIO COMMUNICATION, COMBAT OR RESERVE COMMAND. a. Liaison planes organic to the armored division use low-power voice radio sets. Communication is obtained by presetting the proper channel on available radio sets within the unit.

b. Three voice radio sets of a type installed in Air Force aircraft are authorized the combat or reserve command. Two are mounted in tanks, and the third is mounted in an armored utility vehicle.

These sets are used for direct communication with supporting Air Force aircraft. They normally are operated by Air Force personnel attached to the unit for combat operations. The assistant S-3 Air (communication officer) works closely with Air Force personnel. The Air Force personnel represent the Air Force and have communication with aircraft in flight by use of these radio sets. The assistant S-3 Air represents the ground units and has communication with them by use of a ground voice radio set.

c. The division may establish an *air-request net* (see par. 202). If radio sets for this net are not available within the unit, they may be available in the armored signal company.

206. RADIO AND PERSONNEL ATTACHMENTS, COMBAT OR RESERVE COMMAND. If the combat or reserve command is to operate on a mission at more than normal distance between the unit and the division command post, or over terrain unfavorable to radio communication, request is made for attachment of a high-power radio operation team from the armored signal company (fig. 33). The team will include necessary personnel and equipment mounted in an armored utility vehicle. Its set is used to replace one of the medium-power radio sets in a division net, usually the division command net.

207. MAINTENANCE OF RADIO SETS, COMBAT OR RESERVE COMMAND HEADQUARTERS. Using personnel are trained and required to perform user maintenance on radio sets. One radio repairman is



Figure 33. If the combat command is to operate on a mission at more than normal distance from the division command post, or over terrain unfavorable to radio communication, request is made for attachment of a high-power radio team from the armored signal company.

authorized in the maintenance section. He performs his duties under the technical supervision of the communication officer. He performs necessary signal repairs and makes such inspections as are designated by the communication officer.

208. PERSONNEL AND EQUIPMENT, RADIO RELAY TEAMS, COMBAT OR RESERVE COMMAND. Each radio relay team contains sufficient personnel and equipment to establish one terminal of a radio relay circuit. The team is mounted in a 2½-ton truck and equipped with radio sets, power equipment, spare parts, and other operating equipment. Each team is composed of sufficient personnel to install, operate, and maintain a radio relay terminal. For further information on radio relay operation, see paragraph 133.

209. LIGHT RADIO REPAIR TEAM, COMBAT OR RESERVE COMMAND—GENERAL. A light radio repair team normally will be attached to the combat or reserve command from the armored signal company. This team contains sufficient personnel and equipment for limited field maintenance of signal equipment. The team will consist of from three to five radio repairmen mounted in an armored utility vehicle. The team is equipped with test equipment, tools, and a limited supply of repair and replacement parts, including replacement radio sets.

210. WIRE COMMUNICATION, COMBAT OR RESERVE COMMAND — GENERAL. Wire communication is used to supplement radio communication. However, during certain situations, it may become the

principal means of communication. The availability of equipment, the situation, and the time available for construction and use of the wire system are the predominant factors determining the use of wire communication.

211. LOCAL WIRE INSTALLATION, COMBAT OR RESERVE COMMAND HEADQUARTERS. The switchboard and short local lines are installed by combat command personnel. Personnel are trained to lay wire and operate the switchboard as secondary duties. Telephones are shared whenever possible, to reduce the amount of required construction. Lines are constructed in such a manner as to prevent destruction by moving vehicles or personnel. The switchboard is located in a position convenient to trunk and local lines, preferably in a covered position, the exact location depending on the local situation and terrain. Often the switchboard may be located in a dugout or basement; or, if such a location is not available, it may be placed in an armored vehicle or a prepared fox hole. Operators must be alert, courteous, and efficient and must have complete knowledge of the wire network and telephone directory so that they can put through calls quickly and accurately.

212. WIRE COMMUNICATION BETWEEN COMBAT OR RESERVE COMMAND AND HIGHER HEADQUARTERS. The next higher headquarters is responsible for maintaining wire communication to the combat or reserve command. However, it is only by constant coordination and endeavor by both units that adequate communication is maintained (fig. 34).

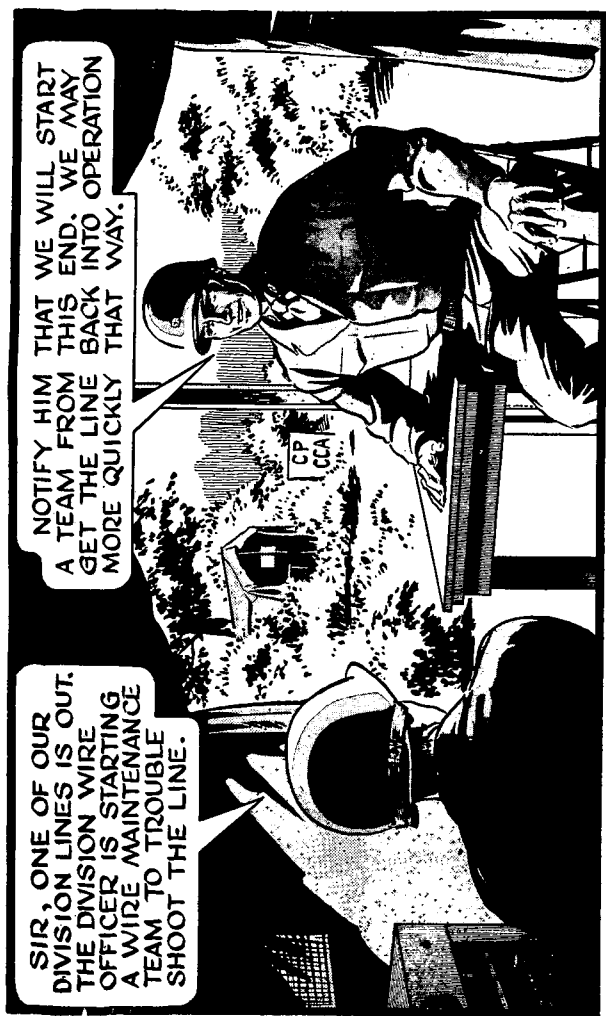


Figure 34. Adequate communication is obtained only by constant coordination and endeavor by all units.

One or more trunk lines will connect the two units. When the necessary personnel and equipment are attached, teletype communication is maintained, in addition to normal telephone communication, to higher headquarters. See figure 24 for a typical division wire telephone system.

213. WIRE COMMUNICATION BETWEEN COMBAT OR RESERVE COMMAND AND ATTACHED AND ADJACENT UNITS.

a. Whenever the situation permits, the combat or reserve command maintains wire communication to attached units. Establishment of a wire system requires the attachment of a construction team from the armored signal company. Organic communication personnel are capable of laying short local lines, but are inadequate when longer trunk lines must be constructed quickly.

b. One or two field wire trunks are laid to each attached battalion. Local lines are laid to each attached separate company. Alternate lines and lateral lines are constructed whenever time and the situation permit.

c. Lateral trunk lines are constructed to adjacent units whenever possible. The division standing operating procedure will indicate the responsibility for lateral lines within the division.

d. See figure 35 for a typical combat or reserve command wire system.

214. RADIO RELAY TEAM, COMBAT OR RESERVE COMMAND—GENERAL.

A radio relay team from the armored signal company normally will be attached to the combat or reserve command for the purpose of maintaining radio relay communica-

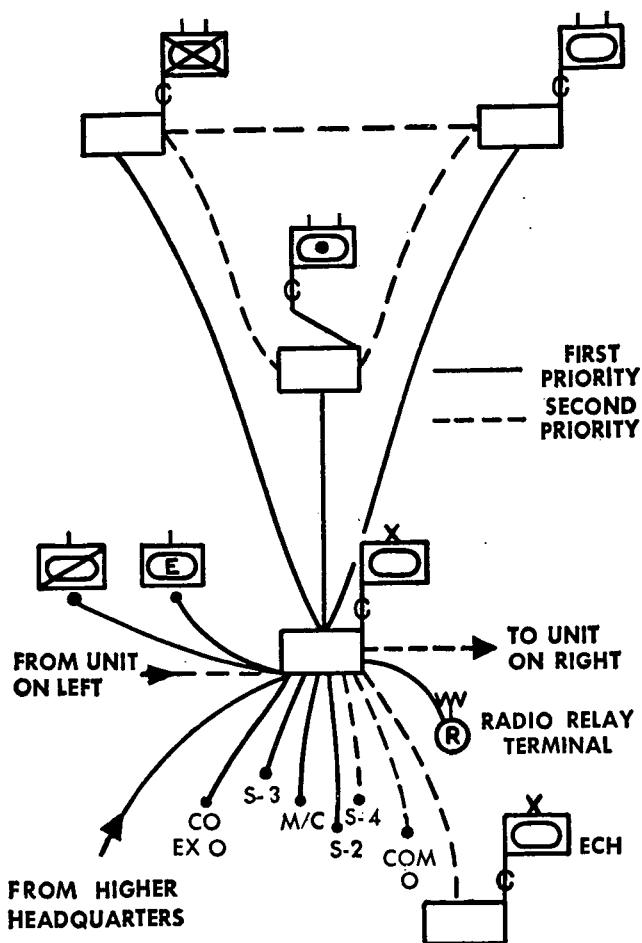


Figure 35. Typical wire system, combat or reserve command.

tion to higher headquarters. Radio relay communication is integrated with the wire system and is used to replace or augment field wire circuits.

215. EMPLOYMENT OF LIGHT RADIO REPAIR TEAM, COMBAT OR RESERVE COMMAND. When attached, this team will operate under the direction of the unit communication officer. It may be located either in the combat or reserve command trains or in the vicinity of the command post. This team is particularly valuable in the reserve command when a unit has been withdrawn from combat for a short period of rest and maintenance. The repair team makes inspections of all radio sets within the unit and, working with the unit repairmen, repairs or replaces all defective signal equipment.

216. WIRE TEAM, COMBAT OR RESERVE COMMAND—GENERAL. One wire construction team normally will be attached to the combat or reserve command from the armored signal company. This team is necessary to provide an adequate wire communication system. Each construction team consists of approximately eight men mounted in one 2½-ton and one ¼-ton truck. The 2½-ton truck is equipped with a power-operated reel, and the ¼-ton truck with a manually operated reel. Each team carries a basic load of 21 miles of wire.

217. EMPLOYMENT OF WIRE TEAM, COMBAT OR RESERVE COMMAND. The wire construction team will operate under the direction of the combat or reserve command communication officer. It is used primarily to construct and maintain wire lines

between the combat or reserve command command post and attached units, but it may be required to assist in the construction or maintenance of wire lines to higher headquarters. See paragraph 88 for additional information.

Section IV. COMMUNICATION DURING MARCHES AND IN BIVOUAC, COMBAT OR RESERVE COMMAND

218. COMMUNICATION DURING MARCHES — GENERAL. Radio is the principal means of communication during marches; messenger and visual communication will be used to supplement radio communication. Wire or radio relay communication cannot be operated on the march.

219. RADIO COMMUNICATION DURING MARCHES, COMBAT OR RESERVE COMMAND. When the situation permits, all radio nets operate during the march. Transmissions are kept to the minimum necessary for march control and interstaff communication. If secondary stations are separated beyond the transmission range of radio sets, provision for relay stations must be made. During periods of listening silence, all operators listen on their proper channels.

220. MESSENGER COMMUNICATION DURING MARCHES, COMBAT OR RESERVE COMMAND. Mounted messengers are detailed to follow staff sections. Scheduled message runs are maintained whenever possible. The vehicle of the message center chief will be marked plainly so that it can be located quickly by incoming messengers.

221. VISUAL COMMUNICATION DURING MARCHES, COMBAT OR RESERVE COMMAND. Whenever possible, arm and hand signals are used for column control in preference to radio. Vehicular panels are displayed as designated by the division SOI. Pyrotechnic and smoke signals are maintained in readiness for use. Both panels and pyrotechnic signals are especially useful for identification to friendly aircraft.

222. COMMUNICATION IN BIVOUAC, COMBAT OR RESERVE COMMAND — GENERAL. Supplementary means of communication are exploited to the utmost in bivouac. Operating personnel are formed into teams and used in shifts in order to render adequate service to the command post and to allow necessary rest for personnel. The message center is established at a place in the command post where it can be reached easily from the road net and is convenient to the staff. The code clerks are utilized by the message center chief in providing 24-hour centralized message center service.

223. RADIO COMMUNICATION IN BIVOUAC, COMBAT OR RESERVE COMMAND. a. Radio sets should not be used for communication between vehicles of an echelon of the headquarters in the same area. The headquarters net is used for intercommunication between echelons of the headquarters.

b. Radio stations in division nets operate as directed by the net control stations. When wire communication is available and the situation permits, either of the command nets may be closed temporarily. The combat command administrative

net may be closed at night when all normal administrative traffic has been cleared and other means of communication are available. Normally, all radio nets operate during daylight hours or during periods of actual combat.

c. Full use is made of remote control systems. Each staff radio set is remotod to the working space assigned that section within the command post. Radio sets and remote control equipment are so utilized that minimum personnel are required for operation. Radio operators will be particularly careful in the use of loudspeakers. Unless discipline is maintained in this matter, a radio can be located easily from a distance by the sounds emanating from its loudspeaker.

224. MESSENGER COMMUNICATION IN BIVOUAC, COMBAT OR RESERVE COMMAND. Messenger service operates under the direction of the message center chief. Both scheduled and special messenger service is maintained. Local messengers may be designated for the delivery of incoming messages.

225. WIRE COMMUNICATION IN BIVOUAC, COMBAT OR RESERVE COMMAND. This service is established whenever the situation permits. One or more trunk lines are constructed to attached battalions, and long locals to separate companies. Higher headquarters will construct wire lines to the combat or reserve command. Radio link communication to higher headquarters is established whenever possible. Local lines are constructed and telephones installed to meet minimum requirements.

Section V. PREPARATION FOR THE ATTACK, COMBAT OR RESERVE COMMAND

226. PLANNING FOR COMMUNICATION. a. An adequate and efficient communication system requires not only adequate equipment and personnel but thorough and constant planning as well. The communication officer is kept informed of all current operations and joins the commander and other staff members in planning for future operations. Details pertaining to communication are coordinated with higher, adjacent, and subordinate units. While plans are made to include all contingencies, the plan is built primarily upon the concept of success in the attack. Alternate means of communication are provided, particularly to critical positions and units.

b. Once a plan has been adopted, all concerned must be well-briefed in its operation. Each section, team, and individual concerned must understand fully the mission and the procedures to be used to accomplish it.

227. COMBAT OR RESERVE COMMAND LIAISON DURING PREPARATION FOR THE ATTACK. The details of planning are coordinated by liaison with affected units. Personal contact between the communication officer or his assistant and the communication or signal officers of higher, adjacent, and subordinate units is made whenever the situation or time permits. This is especially necessary when a new unit has been attached to the combat or reserve command. Liaison by personal contact or

by means of signal communication should be continuous.

228. RADIO COMMUNICATION DURING PREPARATION FOR THE ATTACK, COMBAT OR RESERVE COMMAND.

a. Available radio equipment and personnel are checked against the requirements for radio communication. Training and maintenance are continuous. If radio communication requirements cannot be filled by available equipment or personnel, arrangements must be made for additional support. If movement may cover large areas, a high-power radio set often is attached from the armored signal company.

b. Radio sets and nets are tested by actual operation whenever the situation and security permit.

229. WIRE COMMUNICATION DURING PREPARATION FOR THE ATTACK, COMBAT OR RESERVE COMMAND.

Wire communication is particularly valuable during the planning stage and up to the actual time of attack. Unless the attack is for a limited objective, wire communication often is lost with subordinate units, because of their rapid movements. Plans for the use of wire are made carefully. Route or map reconnaissance is made of all possible routes. Wire lines must be constructed carefully so that vehicles cannot destroy them easily when the attack has commenced.

230. COMBAT OR RESERVE COMMAND COMMAND POST DURING PREPARATION FOR THE ATTACK.

a. The command post is located as close to the line

of departure as practicable in order to avoid displacement during the early stages of the attack.

b. Radio, messenger, and wire communication are provided between the echelons of the headquarters. If preparation for the attack is made under radio or listening silence, radio nets will be ready for instant operation.

231. COMBAT OR RESERVE COMMAND SIGNAL SUPPLY AND MAINTENANCE IN PREPARATION FOR THE ATTACK.

a. Signal maintenance is continuous, but it is intensified during the preparation for attack. All equipment is checked and defective equipment repaired or replaced. The light radio repair team operates at a central location convenient to the units, or it may be scheduled to move from unit to unit.

b. Adequate signal supplies are obtained prior to the attack. Expendable supplies must be available to cover the probable period of the attack.

Section VI. COMMUNICATION DURING THE ATTACK, COMBAT OR RESERVE COMMAND

232. GENERAL. Radio is the principal means of communication during the attack. All available means are used to supplement radio or to replace it during initial periods of listening silence.

233. COMBAT OR RESERVE COMMAND HEADQUARTERS DURING THE ATTACK. a. Communication between the headquarters echelons is principally by radio, but wire communication may be avail-

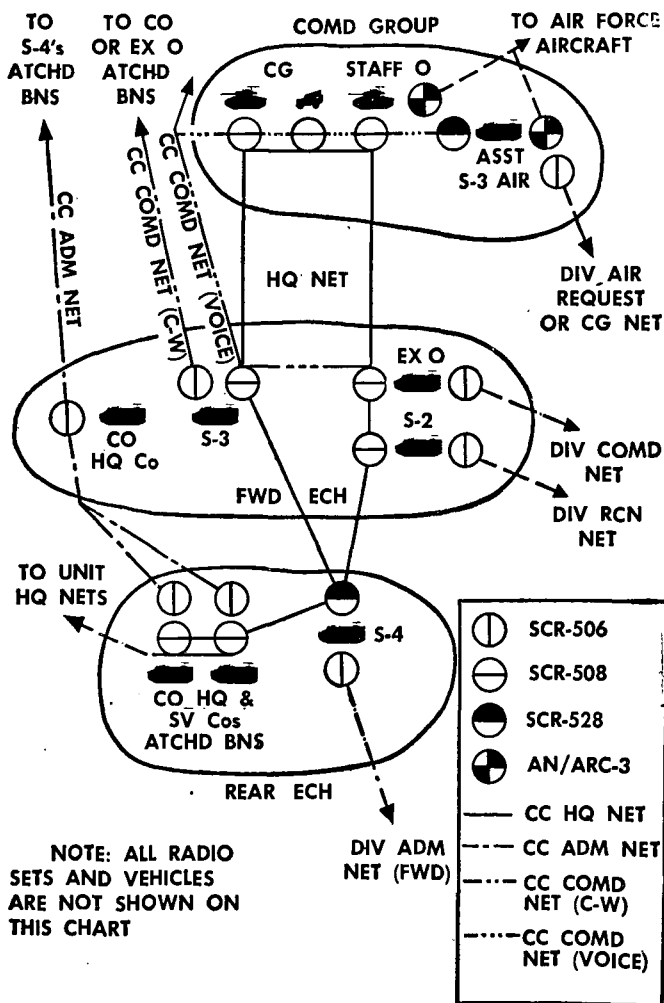


Figure 36. Typical radio nets, combat command headquarters in echelons.

able during the early stages of the attack. Voice radio communication between echelons normally is maintained on the combat or reserve command headquarters net to prevent overloading of the command nets. (See fig. 36.)

b. The message center will operate at the forward echelon. Messengers and code clerks may be attached to the command group as required.

234. COMBAT OR RESERVE COMMAND LIAISON DURING THE ATTACK. Each liaison officer is provided with a voice radio set which he uses in his unit radio net or the net of the unit to which he is sent. Liaison officers make use of other available means of communication as required.

235. RADIO COMMUNICATION DURING THE ATTACK, COMBAT OR RESERVE COMMAND. a. Maximum use is made of radio in the attack. Often the attack will commence under listening silence. All radio sets are manned, ready for operation, with receivers on. Listening silence normally is lifted when enemy contact has been made, or at the discretion of the commander. Efficient radio communication under these circumstances demands discipline and alertness from all personnel.

b. All radio nets will be operated. Encrypted messages are used when necessary, but the bulk of voice radio messages will be sent in the clear, since they pertain to immediate action or to the enemy. Map coordinate codes are used when reporting locations of friendly forces. Whenever possible, alternate frequencies are made available to be used in case of enemy jamming.

c. When the commander or staff officers leave the command post, they maintain radio communication with it by use of their vehicular radio sets.

236. WIRE COMMUNICATION DURING THE ATTACK, COMBAT OR RESERVE COMMAND. Wire communication is maintained until the command post moves forward. Whether or not wire communication is to be installed or extended during or after the movement is dependent upon the situation. Wire is not installed unless sufficient time is available to construct the lines and allow operation. It is wasteful and useless to attempt wire installations when the command post is making rapid moves.

237. RADIO RELAY TEAMS DURING THE ATTACK, COMBAT OR RESERVE COMMAND. Wire communication with higher headquarters often is lost during rapid and repeated moves of the combat or reserve command command post. Radio relay communication should be established and maintained, whenever possible, after each move. When the command post displaces, the radio relay team is moved rapidly forward to the new location, and communication is reestablished before the arrival of the command post. Often this team may accompany the advance party.

Section VII. COMMUNICATION DURING REORGANIZATION AND DURING EXPLOITATION, COMBAT OR RESERVE COMMAND

238. COMMUNICATION DURING REORGANIZATION. During reorganization, all means of communica-

tion used during the attack are continued in operation. The communication officer effects repairs and improvements in the communication system, and makes recommendations for changes incident to the next operation. Every effort is made to repair or replace faulty communication equipment and to resupply such items as wire and batteries.

239. COMMUNICATION DURING EXPLOITATION. Radio is the principal means of communication during exploitation. Communication must be positive and flexible so that rapid changes may be made to fit the immediate situation.

240. COMBAT OR RESERVE COMMAND COMMAND POST DURING EXPLOITATION. The command post normally operates on the move during the exploitation. Communication personnel are employed in shifts, whenever possible, so that necessary rest may be obtained even during marches. Movement and use of messengers is controlled carefully to regulate their use in areas not clear of enemy troops. Only as a last resort should they be used laterally between marching columns.

241. COMBAT OR RESERVE COMMAND LIAISON DURING EXPLOITATION. Liaison is employed during exploitation as the situation requires. Normal channels of communication are employed.

242. RADIO COMMUNICATION DURING EXPLOITATION, COMBAT OR RESERVE COMMAND. Full use is made of radio communication during exploitation. Provision is made for relay stations or high-power

radio sets when they are necessary to maintain communication.

243. RADIO RELAY COMMUNICATION DURING EXPLOITATION, COMBAT OR RESERVE COMMAND. Radio relay communication is established, whenever possible, with higher headquarters. Because of the time necessary for establishment of radio relay communication, it normally will be used only during night bivouacs.

244. WIRE COMMUNICATION DURING EXPLOITATION, COMBAT OR RESERVE COMMAND. Wire communication is seldom possible during exploitation. If time permits, it is established. Full use is made of available commercial circuits or lines.

Section VIII. COMMUNICATION DURING THE DEFENSE, COMBAT OR RESERVE COMMAND

245. GENERAL. See paragraph 172 for a discussion of the types of defense in which the combat or reserve command will be employed. As is the case with the armored division headquarters, the combat or reserve command communication system for a sustained defense will be characterized by extensive use of wire, while the system for a mobile defense will be similar to that used in the attack, with emphasis on the use of radio.

246. COMBAT OR RESERVE COMMAND LIAISON DURING DEFENSE. Continuous liaison is maintained. Lateral communication is provided whenever pos-

sible. Liaison officers should be provided with radio-equipped vehicles in order that continuous contact can be maintained during and immediately after any movement.

247. COMBAT OR RESERVE COMMAND COMMAND POST DURING DEFENSE. Alternate locations should be selected for all command posts, and for all communication facilities installed to and within command posts, to prevent lengthy interruptions by enemy action. Whenever possible, communication facilities are placed in covered positions to prevent destruction by enemy artillery fires.

248. RADIO COMMUNICATION DURING DEFENSE, COMBAT OR RESERVE COMMAND. a. Except during periods of actual combat, radio transmissions usually are restricted or silenced. The radio system must be ready at all times for instant operation, particularly during an enemy attack or when other means of communication fail.

b. Whenever possible, radio sets should be located in covered positions; remote control is used to allow operation from convenient and sheltered positions (fig. 37).

249. WIRE COMMUNICATION DURING DEFENSE, COMBAT OR RESERVE COMMAND. a. Wire communication normally will not be used to any great extent during the mobile defense. In preparation for the sustained defense, a wire system similar to that used prior to the attack will be installed. As time permits, this system will be increased as follows:

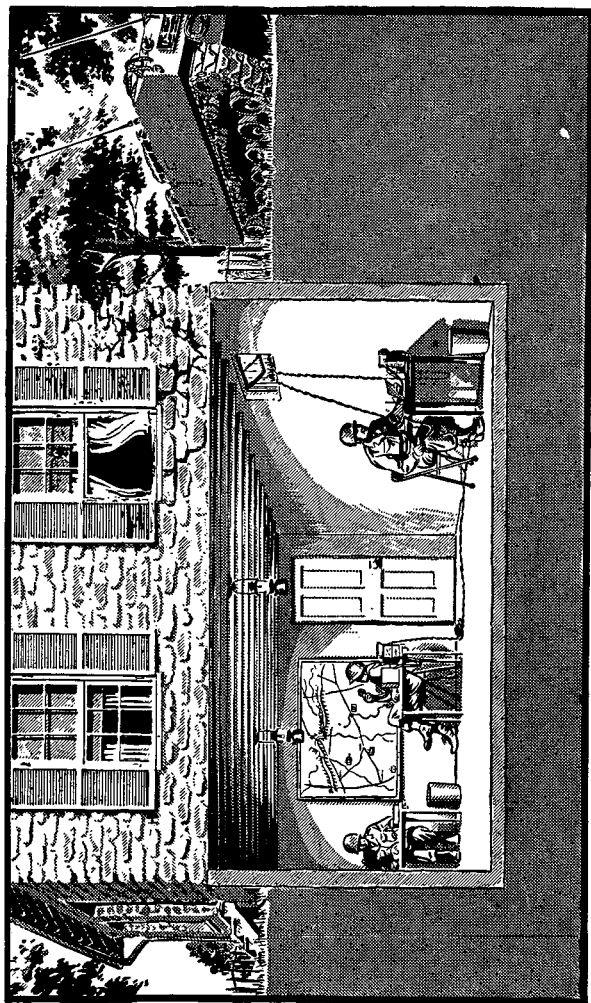


Figure 37. Remote control is used to allow operation from convenient and sheltered position.

- (1) Alternate lines are installed to battalions.
- (2) Lateral lines are constructed to adjacent units.
- (3) Lateral lines are installed between battalions.

b. Installations and lines are constructed in such a manner as to restrict damage by enemy artillery fires. Alternate means of communication must be provided to maintain communication during temporary disruption of the system by heavy enemy fire.

250. OPERATION OF COMBAT OR RESERVE COMMAND RADIO RELAY STATIONS IN THE DEFENSE.

When tactical conditions warrant their use, radio relay stations are located in positions which provide adequate communication to higher headquarters and which prevent enemy ground or air observation. To lessen the chance of enemy interception, these stations are placed, whenever possible, so that land masses are located between the stations and the enemy. During the mobile defense, the use of radio relay communication is limited.

CHAPTER 5

TANK BATTALION (HEAVY AND MEDIUM)

Section I. MISSIONS AND ORGANIZATION, TANK BATTALION

251. MISSION. **a. Medium tank battalion.** Medium tanks are the striking element of the armored division; all elements of the division are coordinated to support them. The mission of the medium tanks is to close with and destroy the enemy. Artillery and other weapons support the attack of tanks; armored infantry accompany the tanks to provide infantry support.

b. Heavy tank battalion. The heavy tank has more protective armor, and a gun capable of greater armor penetration, than the medium tank. However, the heavy tank is less mobile than the medium tank. The employment of heavy tanks will be governed by the presence of hostile tanks. Heavy tanks participate in the attack or counter-attack against hostile tanks and support the advance of medium tanks.

252. ORGANIZATION. There are three medium tank battalions and one heavy tank battalion in the armored division. Unless otherwise specifically stated, the term *tank battalion*, when used in this

manual, applies to both the medium and heavy tank battalions.

253. ORGANIZATION OF THE MEDIUM TANK BATTALION. The medium tank battalion (T/O&E 17-25N) has a headquarters, headquarters and service company; four medium tank companies; and a medical detachment (fig. 38). The headquarters and service company (T/O&E 17-26N) consists of the battalion headquarters platoon, a reconnaissance platoon, an assault gun platoon, a supply platoon, a maintenance platoon, a battalion administrative and personnel section, and the necessary company overhead (fig. 39). The medium tank company (T/O&E 17-27N) has three platoons, each platoon consisting of five medium tanks (fig. 40).

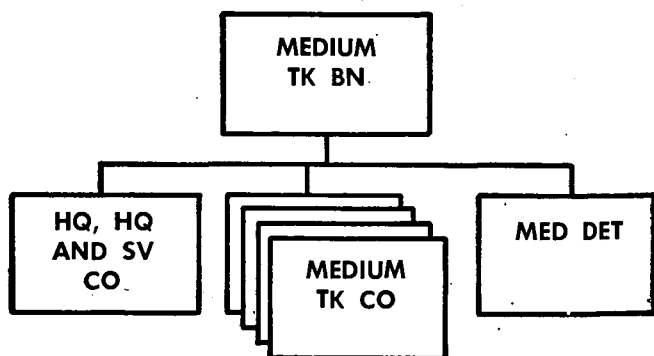


Figure 38. Organizational chart, medium tank battalion.

254. ORGANIZATION OF THE HEAVY TANK BATTALION. The heavy tank battalion (T/O&E 17-35N) has a headquarters, headquarters and serv-

ice company; three heavy tank companies; and a medical detachment (fig. 41). The headquarters and service company (T/O&E 17-36N) is organized similarly to the headquarters and service

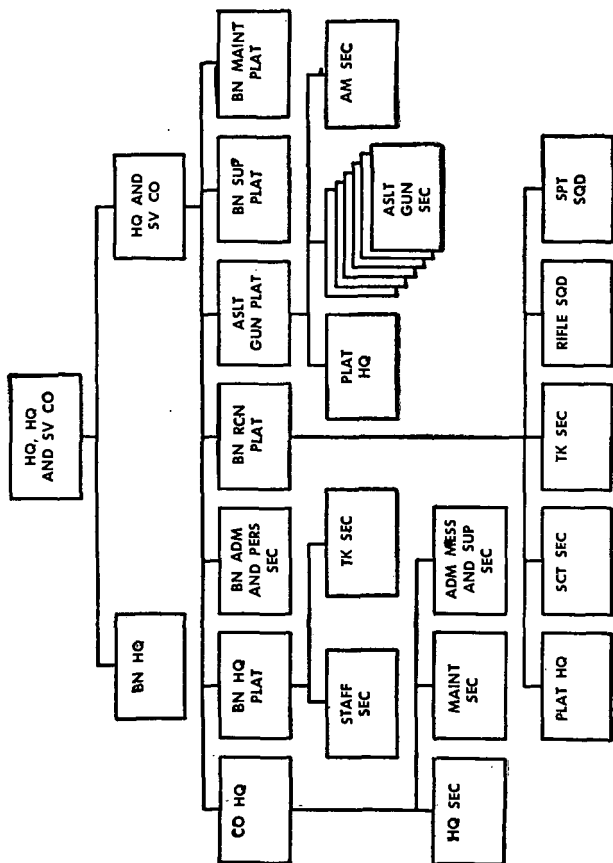


Figure 39. Organizational chart, headquarters, headquarters and service company, medium tank battalion.

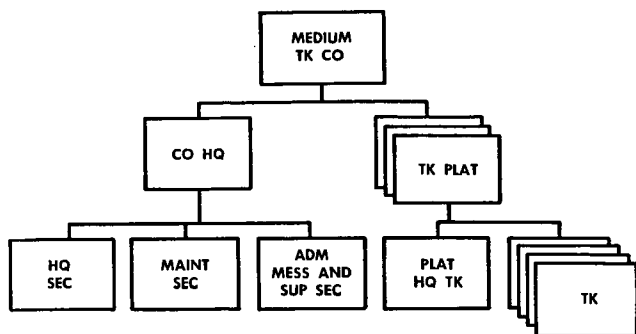


Figure 40. Organizational chart, medium tank company.

company of the medium tank battalion, except that it has no assault gun platoon (fig. 42). The heavy tank company (T/O&E 17-37N) has four platoons, each platoon consisting of five heavy tanks (fig. 43).

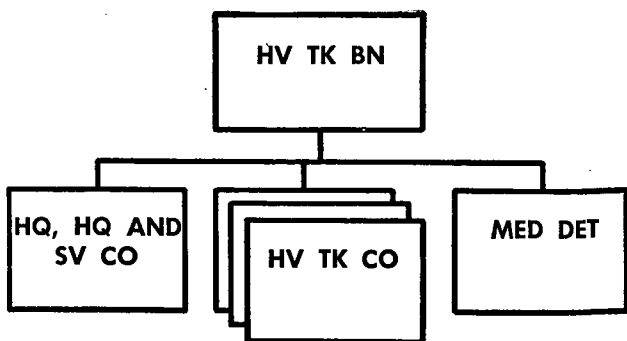


Figure 41. Organizational chart, heavy tank battalion.

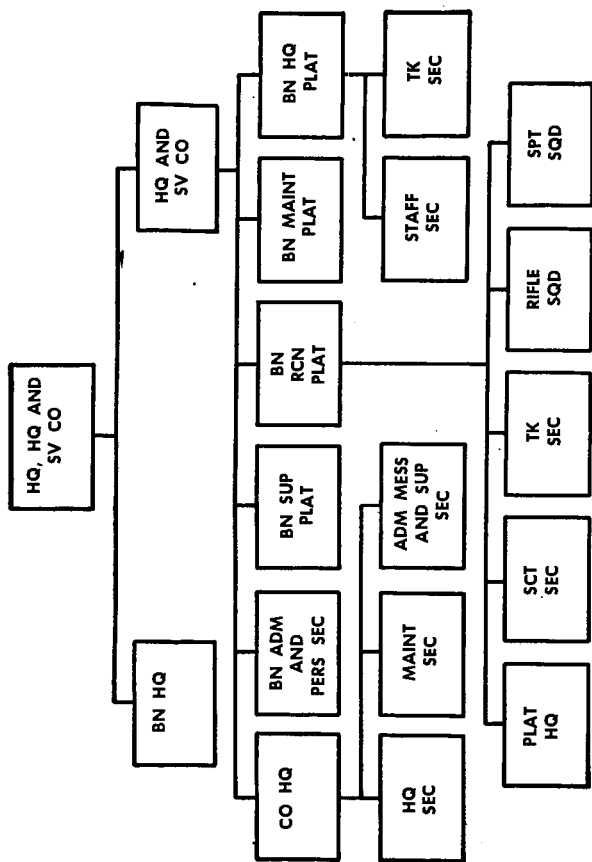


Figure 42. Organizational chart, headquarters, heavy tank battalion.

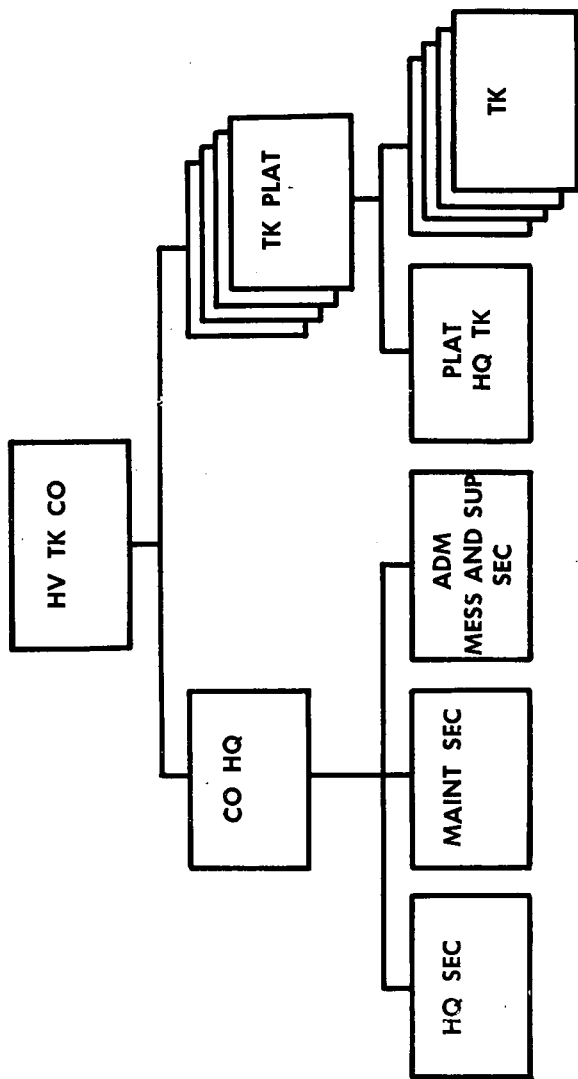


Figure 43. Organizational chart, heavy tank company.

255. TANK BATTALION COMMUNICATION FACILITIES.

The agencies of signal communication in the tank battalion include unit message center teams, wire teams, and radio teams. The means of signal communication available include radio, messenger, visual, wire, and sound. Radio is the principal means of communication within the tank battalion; all other means supplement radio. There is sufficient equipment available to provide adequate communication within the battalion and from the battalion to higher and adjacent units.

256. TANK BATTALION RADIO EQUIPMENT. The radio equipment consists of radio sets and the instruments necessary to perform organizational radio maintenance and repair. The radio sets include medium-power radiotelegraph-telephone sets, and medium- and low-power voice sets. In addition, one medium-power radiotelephone set is provided for air-ground communication.

257. TANK BATTALION WIRE EQUIPMENT. The wire equipment consists of switchboards, telephones, and field wire, together with the necessary items for wire construction and maintenance. Sufficient wire equipment is provided to construct a wire system from battalion headquarters to the companies and platoons.

258. TANK BATTALION VISUAL EQUIPMENT. The visual communication equipment consists generally of flags, panels, and pyrotechnics. Flag sets and vehicular panel sets are supplied to practically every vehicle in the tank battalion. Panel sets,

designed for signaling, are used for emergency ground-to-air communication between the battalion headquarters and friendly aircraft. Pyrotechnics, including signal flares and colored smoke, are used between elements of the tank company and supporting infantry. Pyrotechnics also are used for marking front lines and friendly positions. Arm and hand signals are used for column control and for signaling within small units.

259. TANK BATTALION COMMUNICATION PERSONNEL. The communication personnel in the tank battalion include the communication officer, the battalion and company communication chiefs, the battalion and company radio repairmen, radio operators, code clerks, messengers, and the message center chief. For further information concerning the duties of communication personnel, see paragraphs 6-13.

260. TANK BATTALION LIAISON PERSONNEL. The tank battalion has three liaison officers assigned to the battalion headquarters. Each liaison officer is furnished a $\frac{1}{4}$ -ton truck equipped with a voice radio set. Liaison officers are representatives of the battalion commander. The battalion normally maintains liaison with the next higher headquarters and with adjacent units. Each company has a liaison agent, who maintains liaison between his company and the battalion headquarters, or between his company and other units, as required. Each liaison agent is mounted in, and drives, a $\frac{1}{4}$ -ton truck equipped with a voice radio set.

Section II. ORGANIZATION FOR COMBAT, TANK BATTALION

261. GENERAL. The tank battalions are organized into combined arms teams for combat. Within the reinforced battalion, tanks and armored infantry are combined to form small teams of combined arms, or reinforced companies. Reinforced companies are commanded by company commanders designated in each case by the battalion commander. The mission of the combined arms team dictates who the commander will be. If the tanks are supported by the armored infantry, the tank company commander commands; if the tanks are supporting the armored infantry, the armored infantry commander is in command. No additional command echelon is established between the battalion commander and the company commander. The reinforced company normally consists only of tanks and armored infantry. The battalion assault gun and reconnaissance platoons are retained under battalion control and are employed by the battalion commander to assist in the accomplishment of the battalion mission. For the exercise of control in combat, the battalion headquarters, like the division headquarters, is divided into two echelons, forward and rear, with a command group frequently operating out of the forward echelon.

262. TANK BATTALION COMMAND POST—GENERAL. The battalion command post consists of the necessary vehicles, personnel, and communication equipment to facilitate control, by the commander and his staff, of all command and administrative

functions of the battalion. All communication activities center around the command post. The command post, which is the forward echelon of the battalion headquarters, is supervised by the executive officer. The location of the command post is prescribed by the battalion commander; recommendations for its general location are made to the commander by the S-3, following consultation with the communication officer.

263. RADIO COMMUNICATION, TANK BATTALION—

GENERAL. Since the tank battalion often varies its organization for combat, it requires a communication system which allows flexibility and mobility. For this reason, radio is the principal means of communication within the tank battalion. Vehicular voice radio sets with preset channels and dual receivers provide this flexibility and mobility. All commanders and users of these radio sets must understand fully the flexibility afforded by tunable or multichannel preset radio sets. With prior planning for use of preset channels, units quickly may reestablish communication when changes are made in the composition of combined arms teams.

264. TANK BATTALION RADIO COMMUNICATION TO HIGHER HEADQUARTERS.

The tank battalion will operate secondary stations in three combat command radio nets.

a. Two of these are command nets: one a voice net and the other a radiotelegraph-telephone net. These nets are used for command and for the exchange of messages pertaining to operations.

The voice net is used for direct radio communication between commanders or their representatives during fast-moving situations, particularly when the situation permits the handling of messages in the clear. The radiotelegraph-telephone net is used for cryptographed messages, for written messages that must be copied accurately, and for all messages when the voice set is out of range. The radio sets in the vehicles of the executive officer are secondary station in these nets. The commander and staff officers may operate in or monitor the voice net. (See fig. 30.)

b. The third radio net in which the tank battalion operates is the combat command administrative net. The battalion operates two secondary radio stations in this net. This radiotelegraph-telephone net is used for the exchange of administrative messages between the combat command S-4, the battalion S-4, and the battalion headquarters rear echelon. The station at the tank battalion headquarters forward echelon is located in the vehicle of the S-4, and the rear echelon station is located in the vehicle of the headquarters and service company commander. (See figs. 31 and 36.)

265. TANK BATTALION RADIO NETS—GENERAL. The exact radio nets to be used within the tank battalion depend upon the tactical organization of the battalion. There are no mandatory rules for the composition of any radio net within the tank battalion. However, there are certain basic radio nets that may be used as guides for uniformity and for planning purposes. These basic radio nets are outlined below.

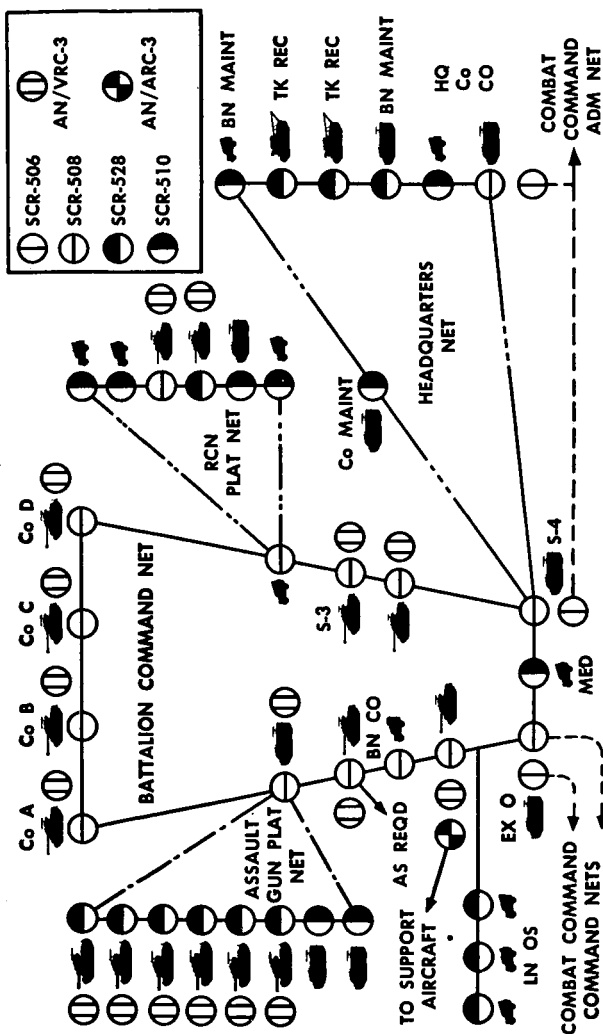


Figure 44. Typical radio nets, medium tank battalion.

266. TANK BATTALION COMMAND NET. The *battalion command net* (fig. 44) is used for the tactical command and control of the battalion. It provides direct voice communication between the battalion commander and staff and the commanders of the tank companies, assault gun platoon, and reconnaissance platoon. Attached units operating directly under battalion control also operate in this net.

267. TANK BATTALION HEADQUARTERS NET. The *headquarters net* (fig. 44) is the administrative net of the tank battalion. It includes the administrative, supply, and maintenance sections of the headquarters and service company. The tank companies use this net in preference to the command net for handling administrative messages with battalion headquarters. Each tank company will preset the channel of the headquarters net on a radio set in one of its maintenance section vehicles. This radio set may be operated in the tank company command net and switched to the headquarters net to transmit and receive administrative messages, or it may be operated continuously in the headquarters net.

268. TANK BATTALION RECONNAISSANCE PLATOON NET. The *reconnaissance platoon net* (fig. 44) provides a separate channel for use of the reconnaissance platoon. The platoon leader's vehicle is equipped with a dual-receiver voice radio set. This permits him to operate in both the reconnaissance platoon net and the battalion command net. Sufficient radio sets are authorized the platoon to

provide communication between elements of the platoon and between the platoon and higher and adjacent units.

269. MEDIUM TANK BATTALION ASSAULT GUN PLATOON NET. The *assault gun platoon net* (fig. 44) provides a separate channel for command and fire control within the assault gun platoon. The platoon leader operates in this net and the battalion command net.

270. TANK COMPANY COMMAND NET. The *tank company command net* (fig. 45) provides communication between the company commander, the platoon leaders, the artillery forward observer, and maintenance elements. This net also provides communication between each platoon leader and his platoon. The tanks of the company commander, the artillery forward observer, and the platoon leaders are equipped with dual-receiver radio sets. The company commander operates in the battalion command net and the company command net. The artillery forward observer operates in the tank company command net and an artillery fire-direction net. Each platoon leader operates in the company command net. His second receiver may be used for liaison with adjacent units; when the platoon is attached to another unit, the second receiver is used to enter the command net of that unit.

271. RADIO NETS, HEAVY TANK BATTALION. The radio nets used within the heavy tank battalion

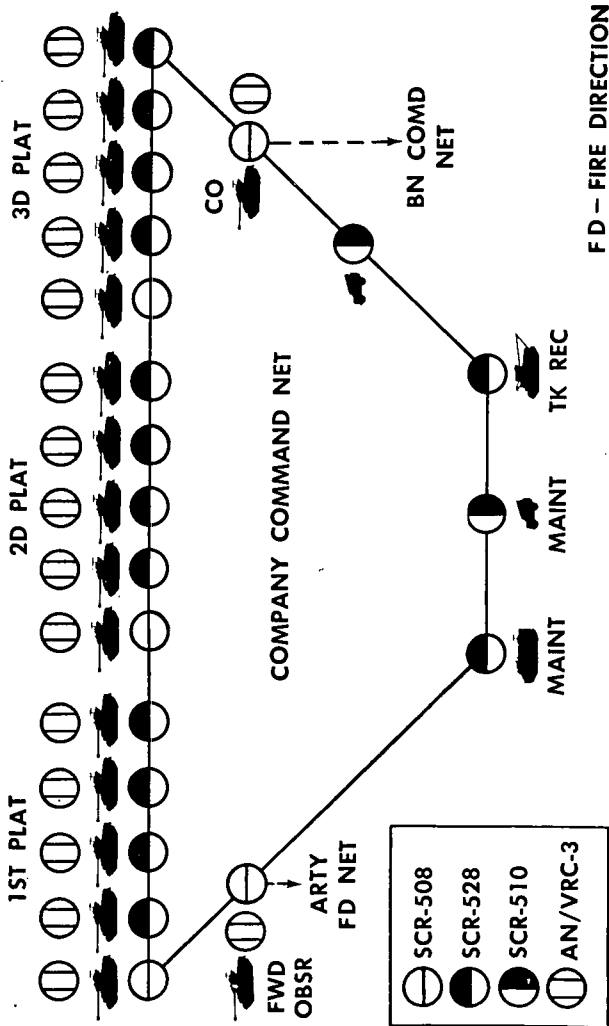


Figure 45. Typical radio net, medium tank company.

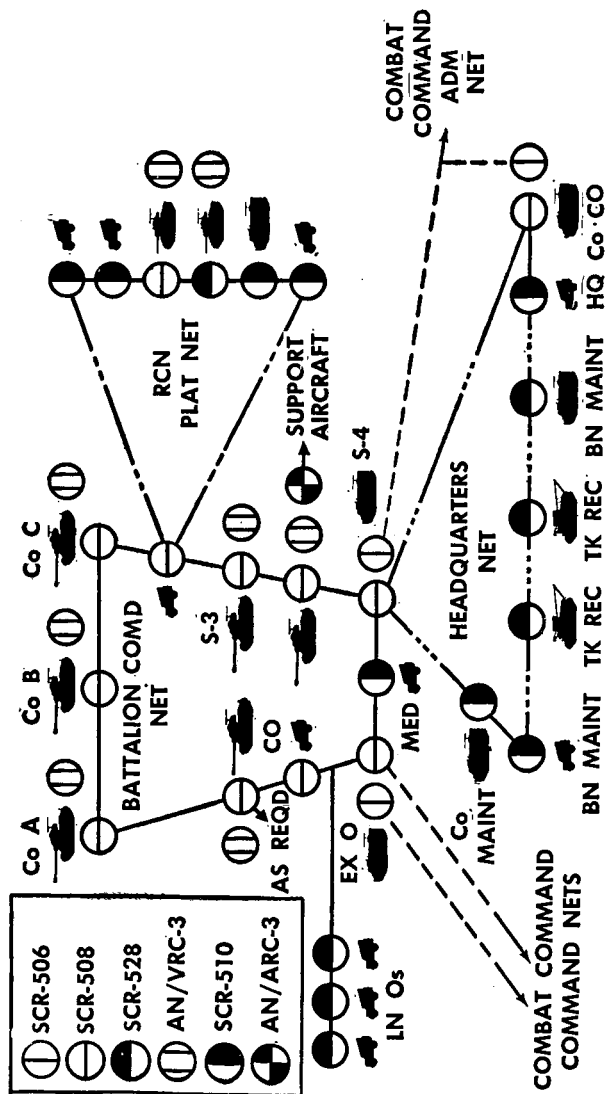


Figure 46. Typical radio nets, heavy tank battalion.

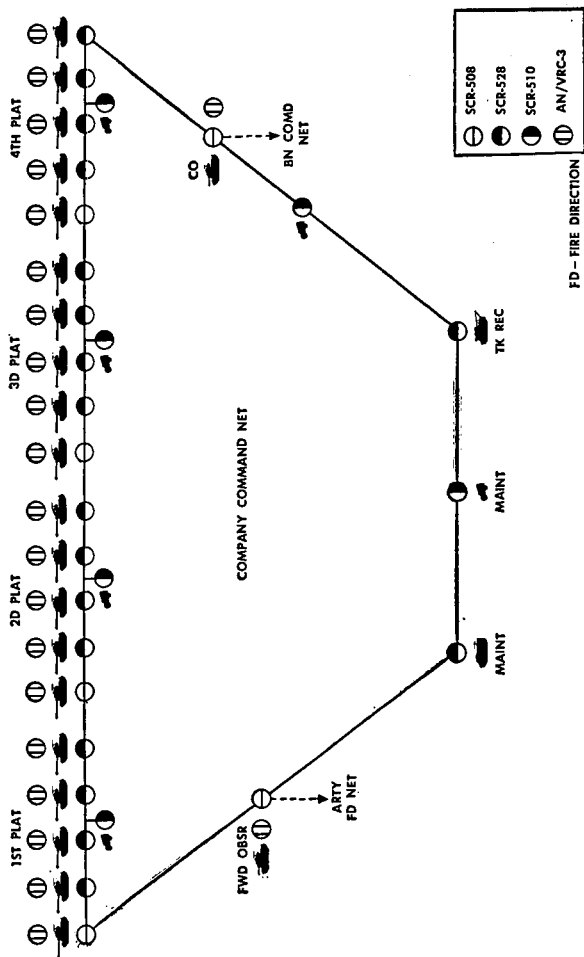


Figure 47. Typical radio net, heavy tank company, heavy tank battalion.

are similar to those used within the medium tank battalion; the only differences are those caused by the difference in organization. The heavy tank battalion will operate the following nets (see figs. 46 and 47) :

- a. Battalion command net.
- b. Headquarters net.
- c. Reconnaissance platoon net.
- d. Tank company command nets.

272. TANK-INFANTRY COMMUNICATION. Each tank is equipped with a low-power voice radio set that will net with radio sets used by dismounted infantry. These sets are used to monitor, or to operate in, supported or supporting infantry nets. The medium-power voice set is used to establish communication with mounted armored infantry. A tank company or platoon attached to an infantry unit will report out of its unit command net and report into the infantry unit command net. (See fig. 59.)

273. TANK BATTALION WIRE COMMUNICATION—GENERAL. Wire is employed in the tank battalions as a supplemental means of communication. It is installed when required. The wire system rarely is extended to maintain communication during movement. The basic wire systems of the tank battalion are shown in figures 48 and 49. These systems may be altered or expanded, consistent with the time, equipment, and personnel available.

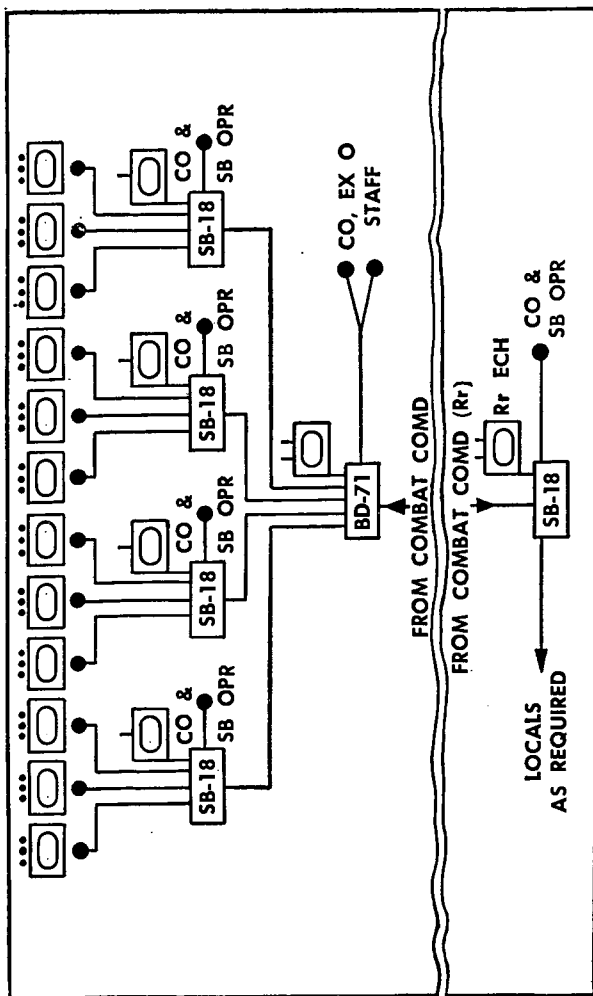


Figure 48. Typical wire system, medium tank battalion.

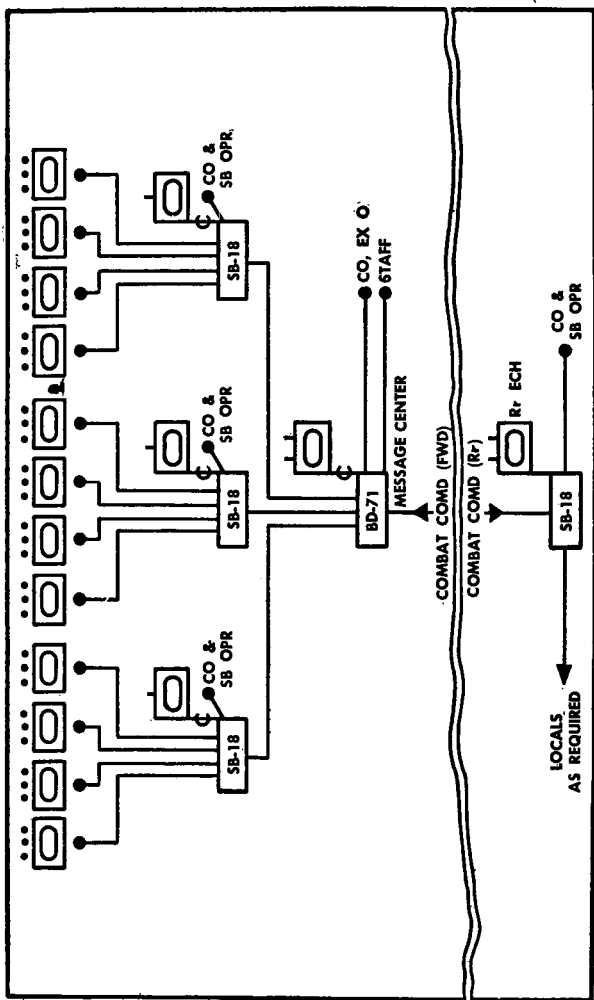


Figure 49. Typical wire system, heavy tank battalion.

Section III. COMMUNICATION DURING MARCHES AND IN BIVOUAC, TANK BATTALION

274. COMMUNICATION DURING MARCHES—GENERAL. During marches, radio is the principal means of signal communication within the battalion. However, marches often will be made under listening silence. Without the use of radio, control is extremely difficult during the march. Other means of communication are inadequate for the full control of marching units. Consequently, good control can be insured only through extensive prior planning, thorough briefing of all personnel, use of an adequate unit standing operating procedure (SOP), and continuous command liaison and supervision. Full use must be made of messengers, road guides, and visual signaling.

275. RADIO COMMUNICATION DURING MARCHES, TANK BATTALION. All battalion radio nets are operative except during periods of listening silence. The battalion command post should be located in the column so that contact can be kept with all elements. Failing this, arrangements must be made for establishing relay stations. During periods of listening silence, all users of radio sets listen on their proper channels, prepared to resume operation when silence is lifted.

276. VISUAL COMMUNICATION DURING MARCHES, TANK BATTALION. Arm and hand signals and flag signals during daylight, and light signals during darkness, are used for column and individual vehicle control during a march. Each vehicle com-

mander must be alert at all times to receive and pass on such signals to the succeeding vehicles in the column.

277. MESSENGER COMMUNICATION DURING MARCHES, TANK BATTALION. When radio communication is available, only limited use is made of messengers during the march. The battalion message center vehicle is marked plainly so that it can be located quickly by incoming messengers. Messengers are used for necessary scheduled runs and for local service during halts.

278. TANK BATTALION LIAISON DURING MARCHES. The tank battalion establishes and maintains liaison with the preceding unit. Each company or march unit establishes and maintains liaison with the preceding unit; this liaison is accomplished by the company liaison agent or by someone else designated by the company commander.

279. RADIO COMMUNICATION IN BIVOUAC, TANK BATTALION. Tank battalion secondary radio stations in combat command nets operate as directed by the net control stations. Except during periods of actual combat, the combat command administrative net often will be closed at night, and the combat command command net may be closed or listening silence imposed if wire communication is available. Battalion nets operate as necessary. Usually, only the battalion command net will operate. This net is used as a warning net and will include such stations as the tactical situation and

security conditions require. Generally, each company, the assault gun platoon, battalion outposts, and reconnaissance patrols will maintain stations in this net. Other battalion nets may be closed if alternate means of communication are available. If combat is not imminent and wire communication is available, all radio nets in the battalion may be closed or silenced. Operators remain in the vicinity of their sets, ready to resume operation when required. Radio communication is reestablished if alternate means of communication fail or if the battalion is attacked or alerted. During periods of listening silence, communication is maintained by use of wire, messengers, and liaison agents.

280. MESSENGER COMMUNICATION IN BIVOUAC, TANK BATTALION. Each company sends a messenger or a liaison agent to the battalion command post, and the battalion, in turn, sends a messenger and liaison officer to the next higher headquarters.

281. WIRE COMMUNICATION IN BIVOUAC, TANK BATTALION. In bivouac, the combat command often will construct a wire line to the tank battalion. The line is connected to the battalion switchboard, and local lines are constructed to the commander and to staff sections. If time is available for the construction and use of the system, telephone lines are laid to the tank companies. In bivouac, all elements of the battalion will be in close proximity to each other, making the construction of wire lines within the battalion comparatively easy. The rear echelon of the battalion

headquarters normally will be part of the combat command trains and will be tied in to the combat command headquarters rear echelon switchboard. Wire communication is obtained between the forward and rear echelons through the combat command switchboards. The importance of the wire system will be increased greatly during periods of radio silence. The value of wire is determined mainly by security considerations; secondly, by convenience.

Section IV. PREPARATION FOR THE ATTACK, TANK BATTALION

282. PLANNING FOR COMMUNICATION. The communication officer must join the commander and staff in planning for operations. The communication officer must keep informed of current operations. He establishes a communication system to provide adequate communication within the battalion and from the battalion command post to subordinate and adjacent units during the attack. He insures that current signal orders, together with any required special prearranged signals or codes, are disseminated to all units of the battalion and to all attached units. He maintains close liaison with the combat command communication officer and coordinates all communication plans and activities with the battalion commander and staff members concerned. The communication officer makes plans for the use of air support and provides such communication facilities as are required by the forward air controller.

283. TANK BATTALION LIAISON DURING PREPARATION FOR THE ATTACK. Liaison is extremely important during the preparation for an attack. The battalion maintains a liaison officer at higher headquarters. Command liaison is particularly important between the company commanders and platoon leaders of the tank and armored infantry companies, and between tank commanders and infantry squad leaders. Each company maintains a messenger or a liaison agent at the battalion command post.

284. COMMUNICATION DURING PREPARATION FOR THE ATTACK, TANK BATTALION. **a. Radio.** Basic radio nets are altered to support the tactical organization and plan. Attached units operating directly under battalion control report into the battalion command net. Units operating under company control report into the company command net. Low-power voice sets mounted in tanks for communication with dismounted infantry are pretuned and test-operated on appropriate infantry channels. Radio transmissions are kept to a minimum; but, when security conditions permit, all nets will be test-operated for a short period to check equipment and operating personnel. Last-minute changes in the tactical organization may require changes in the netting of radio sets. If changes are necessary during periods of listening silence, radio sets are retuned by means of phantom antennas supplied with the sets.

b. Wire. Wire communication is a valuable means of communication during the preparation for the attack. It should be installed if time per-

mits. It rarely is installed below company level during this period.

285. TANK BATTALION COMMAND POST DURING PREPARATION FOR THE ATTACK. The command post is located as far forward as possible to facilitate control and to avoid early displacement when the attack is launched. Message center personnel are briefed on the forthcoming operation, particularly on the probable location of higher and subordinate unit command posts during the attack. The communication officer insures that command post personnel who will need current signal operation instructions and other pertinent signal orders are in possession of and are familiar with these instructions. Radio sets may be operated from staff sections by use of remote control equipment. The communication system is established to maintain the mobility of the command post.

286. TANK BATTALION SIGNAL SUPPLY AND MAINTENANCE IN PREPARATION FOR THE ATTACK. The communication officer, in conjunction with the battalion S-4, insures that needed items of signal equipment are in the hands of using troops prior to the attack. Organizational maintenance is carried out by the user of the equipment and the unit radio repairman.

Section V. COMMUNICATION DURING THE ATTACK, TANK BATTALION

287. GENERAL. The success of an attack, to a large extent, is dependent upon the efficiency of the communication system. After the attack has

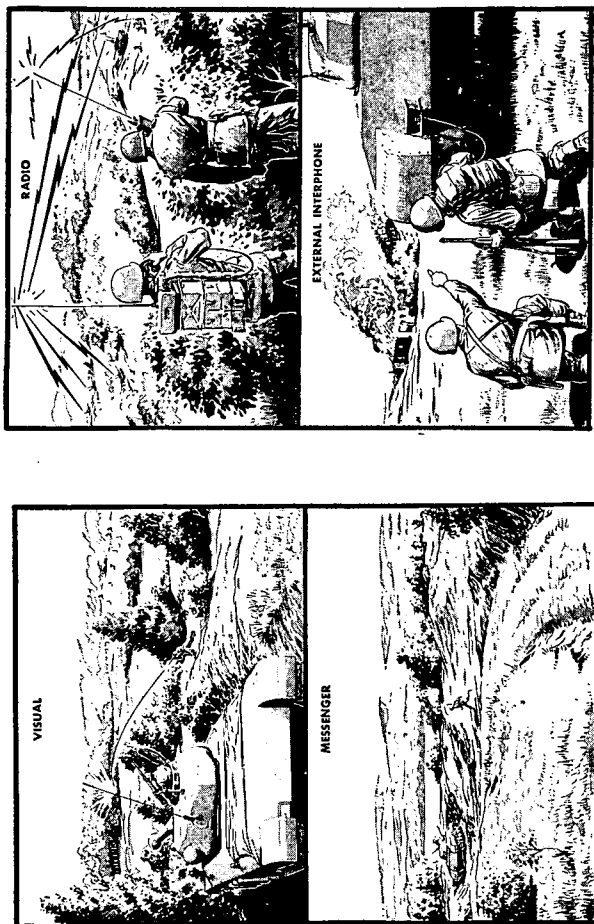


Figure 50. All means of communication are employed during the attack.

been launched, orders usually are fragmentary and often may be issued by radio. Alternate channels of communication should be ready for immediate use. Although radio is the principal means of communication within the tank battalion during the attack, radio alone does not have all essential characteristics of a reliable and secure communication system. It must be supplemented by other means (fig. 50).

288. TANK BATTALION COMMAND POST DURING THE ATTACK. The battalion command post remains mobile during the attack. It follows the command group closely enough to maintain communication with the commander, the forward elements, adjacent units, and higher headquarters. Communication between echelons of the headquarters normally is maintained by radio and messenger. Radio contact between echelons normally is maintained on the headquarters net to prevent overloading of the command net.

289. TANK BATTALION LIAISON DURING THE ATTACK. Battalion liaison officers remain at higher headquarters and adjacent unit headquarters in order to keep the battalion commander informed on any new plans or developments. Each company will keep a liaison agent at battalion headquarters. Whenever possible, liaison personnel maintain voice radio contact with the battalion headquarters.

290. RADIO COMMUNICATION DURING THE ATTACK, TANK BATTALION. All radio nets will operate during the attack. If the attack is launched under

listening silence, all radio sets are manned and ready for instant operation. Receivers are tuned to their proper channels and monitored constantly. Listening silence normally is lifted when enemy contact is made. The principles of radio discipline and procedure must be followed strictly to insure that the radio nets can carry the heavy traffic load occasioned by the attack. During the attack, the bulk of all voice radio messages will be sent in the clear, but messages are not transmitted indiscriminately in the clear. If messages are transmitted in the clear, they are worded so as to give as little information as possible to the enemy. Locations of friendly forces are encoded in map coordinate codes. Units must maintain contact with both higher and lower echelons.

291. WIRE COMMUNICATION DURING THE ATTACK, TANK BATTALION. Because it restricts mobility, wire rarely is used in the tank battalion during the attack. If wire is to be installed, sufficient time must be available to construct the lines and allow operation.

292. VISUAL COMMUNICATION DURING THE ATTACK, TANK BATTALION. Arm and hand signals and flag signals are used within the tank companies and platoons and attached infantry primarily for giving short control orders. Lights and colored smoke signals may be used for identifying and marking targets or positions. Smoke and vehicular panels are used for identification to friendly aircraft. They may be used to indicate front-line positions and friendly vehicles.

Section VI. COMMUNICATION DURING REORGANIZATION AND DURING EXPLOITATION, TANK BATTALION

293. COMMUNICATION DURING REORGANIZATION.

During reorganization, all means of communication used during the attack are continued in operation. Necessary repairs and changes are effected in the communication system. If units are regrouped, the required changes are made in tuning and netting of radio sets. Every effort is made to repair or replace faulty communication equipment and to resupply such items as radio tubes and batteries. Wire communication is installed during this period if time is available.

294. COMMUNICATION DURING EXPLOITATION.

During the exploitation, the tank battalion moves rapidly. Although it frequently may become isolated in enemy territory so far as physical contact with friendly troops is concerned, the tank battalion never must become isolated so far as communication with supporting units and higher headquarters is concerned. When the battalion has no communication with higher headquarters, it no longer is a tactical maneuvering force in the hands of the higher commander. Each commander must maintain communication within his unit. Although it is the responsibility of the higher headquarters to maintain communication with subordinate units, all commanders must cooperate in reestablishing communication if it is disrupted.

295. TANK BATTALION COMMAND POST DURING EXPLOITATION. The battalion command post normally operates on the move during exploitation. Communication personnel are organized into shifts so that they can obtain necessary rest. The movement and use of messengers are controlled carefully to prevent their employment in areas not clear of enemy troops. If it becomes necessary to send a messenger through doubtful areas, he should be informed of the situation and instructed in the security measures to be observed in the event of capture. The use of double messengers may be desirable under such circumstances.

296. RADIO COMMUNICATION DURING EXPLOITATION, TANK BATTALION. Radio continues to be the principal means of communication. Provision is made for relay stations if distances between units become too great to permit direct radio communication. Each unit must have a plan for the continuation of radio communication in the event that key radio vehicles are lost. The tank company must maintain communication with the battalion command post. If the radio set of the company commander is destroyed, another radio set must be entered immediately into the battalion command net to reestablish communication (fig. 51). With proper planning and training, the company headquarters never will lose communication with higher headquarters as long as there is one radio set in the company. This same principle is applied in all echelons of the battalion. Signal maintenance and supply are extremely difficult during this

period, but every effort is made to continue these functions. Radio repairmen check and repair all radio sets as time and the situation permit. Usually, the repairman will have to move to the vehicles to effect repairs. Full use is made of spare radio sets for quick replacement of defective sets; the defective set is repaired as time permits and is used for further replacement.

297. WIRE COMMUNICATION DURING EXPLOITATION, TANK BATTALION. Wire rarely is used within the tank battalion during the exploitation. If the battalion is to halt during hours of darkness, it is likely that the combat command will construct a telephone line to battalion headquarters if the distance is not too great.

298. VISUAL COMMUNICATION DURING EXPLOITATION, TANK BATTALION. Within the tank and armored infantry companies and platoons, arm and hand signals are used extensively. Identification panels are displayed on vehicles for identification to friendly aircraft. Colored smoke may be used for marking targets or positions.

Section VII. PREPARATION FOR THE DEFENSE AND COMMUNICATION DURING THE DEFENSE, TANK BATTALION

299. PLANNING FOR COMMUNICATION. The communication system is planned to support the tactical plans. The tactical employment of the tank battalion in defense will determine the relative use of



Figure 51. If the radio set of the company commander is destroyed, another radio set must be entered immediately into the battalion command net to reestablish communication.

wire and radio communication. The communication system employed in a mobile defense will be similar to that employed in the attack. However, the wire system may be expanded to include the company headquarters, outposts, and observation posts. The employment of the battalion in a sustained defense will require use of a greater amount of wire equipment than normally is authorized the unit. Planning should include the actions necessary to obtain the additional wire equipment required for this type of operation. Details pertaining to communication are coordinated with higher, adjacent, and subordinate units. Alternate means of communication always are provided.

300. COMMUNICATION DURING THE DEFENSE. a.

A tank battalion engaged in a mobile defense employs generally the same type of communication system that it employs in the attack.

b. If it is to engage in a sustained defense, the communication system is expanded to include additional wire and messenger service. Elements not actively engaged with the enemy normally maintain listening silence. The basic wire system is expanded to provide adequate communication facilities between all elements. During this type of operation, lateral communication between adjacent front-line units becomes essential.

c. For further information on the mobile and sustained defense, see paragraph 351.

301. TANK BATTALION COMMAND POST DURING DEFENSE.

An attack against a defensive position probably will be preceded by an intensive artillery

preparation directed at command posts, routes of communication, and known prepared positions. For this reason, it is important that the command post be well-camouflaged and concealed, that alternate wire lines be constructed, that communication equipment be protected amply, and that nonessential vehicles be dispatched to the rear. Alternate positions are chosen and are prepared for occupation if necessary. Wire lines, if constructed, and installations are placed so as to prevent or reduce damage from enemy fires.

302. RADIO COMMUNICATION DURING THE DEFENSE, TANK BATTALION.

a. During a mobile defense, radio communication normally will be used in preference to wire; because of the maneuver involved in this type of defense, it usually will be impracticable to install wire communication. The normal battalion radio nets will be in operation; the battalion operates in nets of higher headquarters as directed.

b. When the tank battalion is to be employed in a sustained defense, radio communication normally is replaced by wire communication as rapidly as possible. Of the two radiotelegraph-telephone nets to higher headquarters, the administrative net may be closed down, and the command net may be used only as a warning net when wire is installed to higher headquarters. Within the battalion, the battalion command net also may be used only as a warning net if wire is installed to subordinate units. If it is not practicable to construct wire lines to observation posts and

strong points, these installations should be supplied with radio equipment and normally should enter either the battalion command net or appropriate company command nets.

c. During the defense, radio security is of paramount importance. The enemy may have sufficient time to act on any information he may receive from opponent's transmissions. The best radio security is radio silence. Because this often is not practicable within the armored division, all precautions must be taken to insure correct procedure, minimum transmissions, and use of encrypted messages.

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303. WIRE COMMUNICATION DURING DEFENSE, TANK BATTALION. a. During a mobile defense, wire communication normally will be used to a minimum. A wire system is not adapted to the mobile defense.

b. A sustained defense requires the construction of wire lines to all front-line units and outposts. It may be necessary to obtain a special authorization of wire and telephone equipment from the armored signal company in order to establish the required wire system. Alternate and lateral lines are laid whenever time permits.

CHAPTER 6

ARMORED INFANTRY BATTALION

Section I. MISSION AND ORGANIZATION, ARMORED INFANTRY BATTALION

304. MISSION. The mission of the armored infantry is to close with and destroy the enemy by fire and maneuver, to repel hostile assaults in close combat, and to provide infantry support for tanks.

305. ORGANIZATION. There are four armored infantry battalions in the armored division. Each battalion (T/O&E 7-25N) is composed of a headquarters, headquarters and service company; four rifle companies; and a medical detachment (fig. 52). The headquarters and service company (T/O&E 7-26N) consists of the company headquarters, a reconnaissance platoon consisting of a platoon headquarters, scout section, tank section, rifle squad, and support squad; a mortar platoon of three 81-mm mortars; a counterfire squad; and the necessary supply, maintenance, and administrative personnel to support the battalion (fig. 53). Each rifle company (T/O&E 7-27N) is composed of a company headquarters; three rifle platoons, each consisting of three rifle squads and

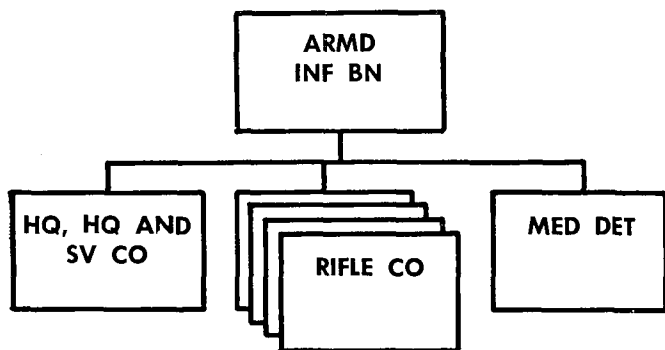


Figure 52. Organizational chart, armored infantry battalion.

a machine-gun squad; and a mortar platoon of three 60-mm mortars (fig. 54).

306. ARMORED INFANTRY BATTALION COMMUNICATION FACILITIES. Radio is the principal means of communication. Wire, messenger, visual, and sound communication supplement radio. Sufficient equipment is authorized to provide an efficient and adequate communication system within the battalion, and communication between the battalion and higher and adjacent units.

307. ARMORED INFANTRY BATTALION RADIO EQUIPMENT. The radio equipment consists of radio sets and the equipment necessary to perform organizational maintenance and repair. The radio sets include medium-power radiotelegraph-telephone sets and medium- and low-power voice sets. The medium-power radiotelegraph-telephone sets are

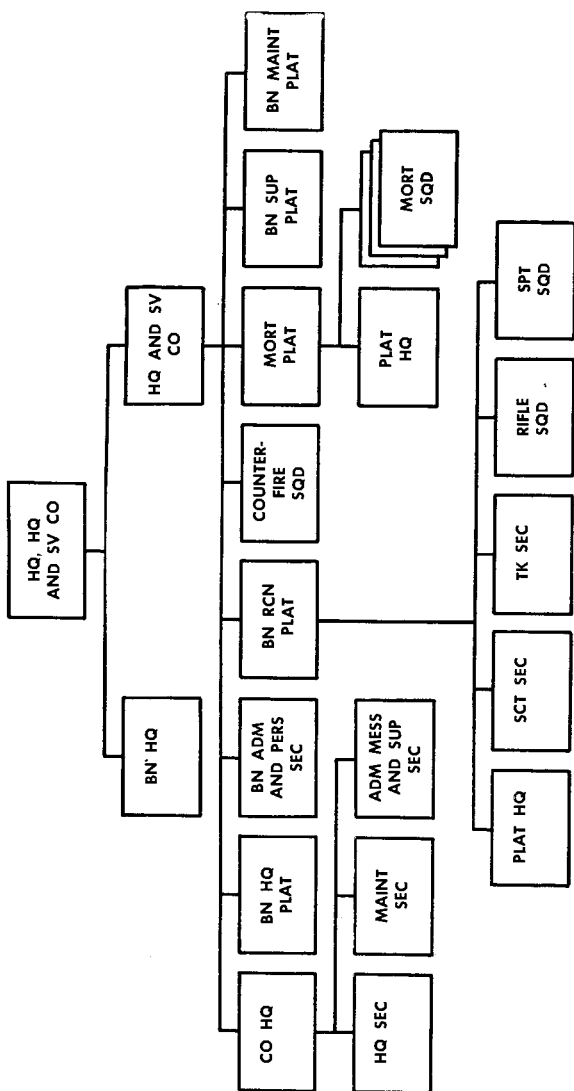


Figure 53. Organizational chart, headquarters, headquaters and service company, armored infantry battalion.

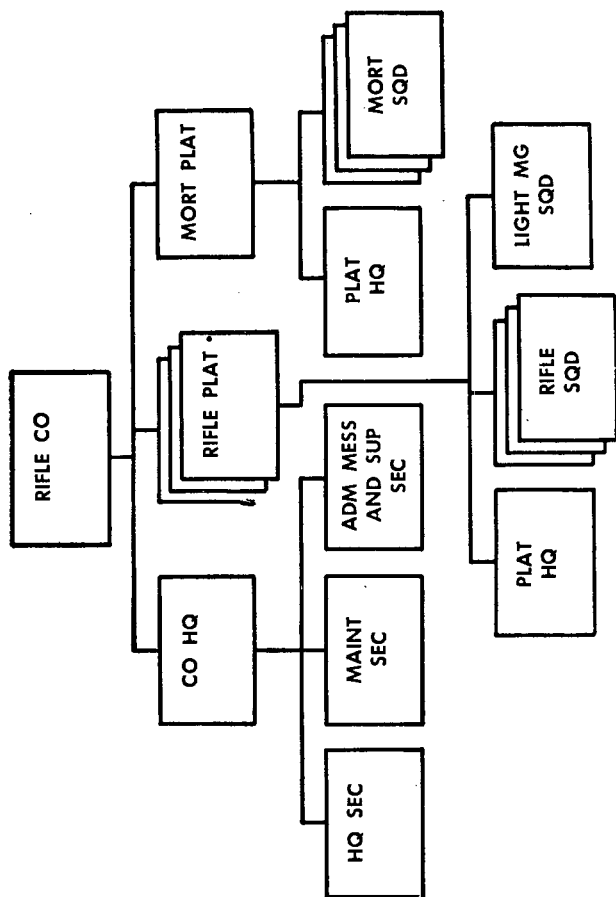


Figure 54. Organizational chart, rifle company, armored infantry battalion.

used in the command and administrative nets of the next higher unit. The medium-and low-power voice sets are used for communication between and within all units of the battalion and between the battalion and adjacent and higher units. All elements of the battalion are provided with portable radiotelephone sets with which to maintain control when they dismount to engage the enemy.

308. ARMORED INFANTRY BATTALION WIRE EQUIPMENT. The wire equipment consists of switchboards, telephones, field wire, and wire-laying, wire maintenance, and construction equipment. Both sound-powered and battery telephones are authorized for the battalion. Sufficient wire equipment is authorized for the construction of a wire system from the battalion to the companies and to appropriate platoons of the headquarters and service company.

309. ARMORED INFANTRY BATTALION VISUAL EQUIPMENT. The visual communication equipment consists generally of flags, panels, and pyrotechnics. Arm and hand signals are used for column control and for signaling within small units, particularly the rifle platoon and the rifle squad. Vehicular flag sets and signal panels are supplied to practically every vehicle in the armored infantry battalion. The panel sets are used for emergency ground-to-air communication between the battalion and friendly aircraft. Pyrotechnics, including signal flares and colored smoke, are used between elements of the armored infantry com-

pany and tanks. During night operations, pyrotechnics frequently are used for illumination and warning purposes.

310. ARMORED INFANTRY BATTALION COMMUNICATION PERSONNEL. The communication personnel in the armored infantry battalion include the communication officer, the battalion communication chief, company communication chiefs, the battalion radio repairman, company radio repairmen, radio operators, code clerks, messengers, and the message center chief. See paragraphs 6-13 for duties and responsibilities of signal and communication personnel.

Section II. ORGANIZATION FOR COMBAT, ARMORED INFANTRY BATTALION

311. GENERAL. The armored infantry battalions are organized into combined arms teams for combat. Within the reinforced battalion, armored infantry and tanks are combined to form reinforced companies or small teams of combined arms. Reinforced companies are commanded by company commanders, designated in each case by the battalion commander. The mission of the combined arms team dictates who the commander will be. If the tanks are supported by the armored infantry, the tank company commander commands; if the tanks are supporting the armored infantry commander commands. No additional command echelon is established between the battalion commander and the company commander. The reinforced com-

pany normally consists only of tanks and armored infantry. The battalion mortar and reconnaissance platoons are retained under battalion control to be employed by the battalion commander to assist in the accomplishment of the battalion mission. For command and control in combat, the battalion headquarters, like the division headquarters, normally is divided into two echelons, forward and rear; a command group frequently operates out of the forward echelon (CP). The battalion maintains liaison with the next higher headquarters and adjacent units through liaison officers, who are the representatives of the battalion commander. Each company maintains liaison with the battalion or other units by means of liaison agents. Each of the liaison officers assigned to the battalion headquarters is mounted in a radio-equipped $\frac{1}{4}$ -ton truck. Within each company, the bugler, who drives a radio-equipped $\frac{1}{4}$ -ton truck often acts as a liaison agent.

312. ARMORED INFANTRY BATTALION COMMAND POST—GENERAL. The battalion command post (headquarters forward echelon) is supervised by the executive officer. The command post consists of the necessary personnel, vehicles, and communication equipment to facilitate control, by the commander and his staff, of all command and administrative functions of the battalion. All communication activities center around the command post. These activities include the message center, liaison, radio stations, and telephone switchboards. The general location of the battalion command post is prescribed by the battalion com-

mander. The exact location may be selected by either the battalion S-1 or the executive officer, in conjunction with the communication officer. The interior arrangement of the command post normally is prescribed by the battalion S-1 after consultation with the communication officer.

313. RADIO COMMUNICATION, ARMORED INFANTRY BATTALION—GENERAL. Radio provides the armored infantry with a flexible and mobile communication system. It provides both communication between the armored infantry and tank units and communication within armored infantry units. Because of the fact that the armored infantry battalion normally moves mounted to the battle area and then dismounts from its armored personnel carriers to fight, it must be able to maintain radio communication both while mounted and while dismounted. In general, the same radio nets are established under both conditions.

314. ARMORED INFANTRY BATTALION RADIO COMMUNICATION TO HIGHER HEADQUARTERS. The armored infantry battalion will operate secondary stations in three combat command nets. Their operation is similar to that in the tank battalion.

a. Two of these are command nets (fig. 30): one a voice net and the other a radiotelegraph-telephone net. They provide radio communication between the combat command commander and the commanders of attached units.

b. The third net in which the armored infantry

battalion operates is the combat command administrative net (fig. 31). This radiotelegraph-telephone net is used for the exchange of messages pertaining to administration. The armored infantry battalion will operate two secondary stations in this net; one is located in the vehicle of the battalion S-4 in the forward echelon, and the other in the vehicle of the headquarters and service company commander in the rear echelon. Thus, the net provides communication not only between the combat command and the battalion, but also between the forward and rear echelons of the battalion headquarters.

c. When the armored infantry battalion dismounts to fight, the radio nets to higher headquarters remain unchanged. Even when the armored infantry companies are dismounted, the battalion command post may remain mounted; in this case, the battalion headquarters uses the mounted nets. However, when the battalion command post is dismounted, the mounted radio nets to higher headquarters remain in operation from the vehicle assembly area. Messages for the dismounted battalion command post then are relayed from the vehicle assembly area to the appropriate battalion staff section over a voice radio which is in the dismounted battalion command net.

315. ARMORED INFANTRY BATTALION RADIO NETS—GENERAL. The exact radio nets to be used within the armored infantry battalion depend upon the tactical situation and the grouping of the battalion. There are no mandatory rules for the composition

of any radio net in the armored infantry battalion; the radio nets discussed below may be used as guides. They are changed as necessary to fit the immediate situation of the battalion. In general, the dismounted radio nets to subordinate units parallel the mounted nets.

316. ARMORED INFANTRY BATTALION COMMAND NETS. The *battalion command nets* (figs. 55 and 56), one mounted and one dismounted, are used for the tactical command and control of the battalion. They provide direct voice radio communication between the battalion commander and staff and the commanders of the rifle companies and the mortar and reconnaissance platoons. Attached units operating directly under battalion control enter the battalion command nets. Vehicular voice radio sets are used in the mounted net, while portable voice radio sets of the "walkie-talkie" type, and their vehicular adaptations, are used in the dismounted net. The dismounted net is established whenever any armored infantry element dismounts to fight.

317. ARMORED INFANTRY BATTALION HEADQUARTERS NET. The *headquarters net* (figs. 55 and 56) is the administrative net of the armored infantry battalion. It includes the administrative, supply, and maintenance sections of the headquarters and service company. Its operation is similar to that of the headquarters net within the tank battalion.

318. ARMORED INFANTRY BATTALION RECONNAISSANCE PLATOON NET. The *reconnaissance platoon net* (figs. 55 and 56) provides a separate channel for use of the reconnaissance platoon. The platoon leader's vehicle is equipped with a dual-receiver voice radio set; this permits him to operate in both the reconnaissance platoon net and the battalion command net. Sufficient radio sets are included to provide communication within the platoon and with adjacent units.

319. ARMORED INFANTRY BATTALION MORTAR PLATOON NETS. The *mortar platoon nets* (figs. 55 and 56) provide separate channels for the command and fire control of the mortar platoon. Both vehicular and portable voice radio sets are provided; the portable radio sets are used during dismounted platoon action. The platoon leader operates in these nets and the battalion command net.

320. RIFLE COMPANY COMMAND NETS. The *rifle company command nets* (figs. 57 and 58) are used for tactical command and control of the company. They provide communication between the company commander, the platoon leaders, and maintenance elements, and communication between each platoon leader and his squad leaders. Both vehicular and portable voice radio sets are provided; the portable radio sets are used for dismounted action. The company commander operates in both the company command net and the battalion command net.

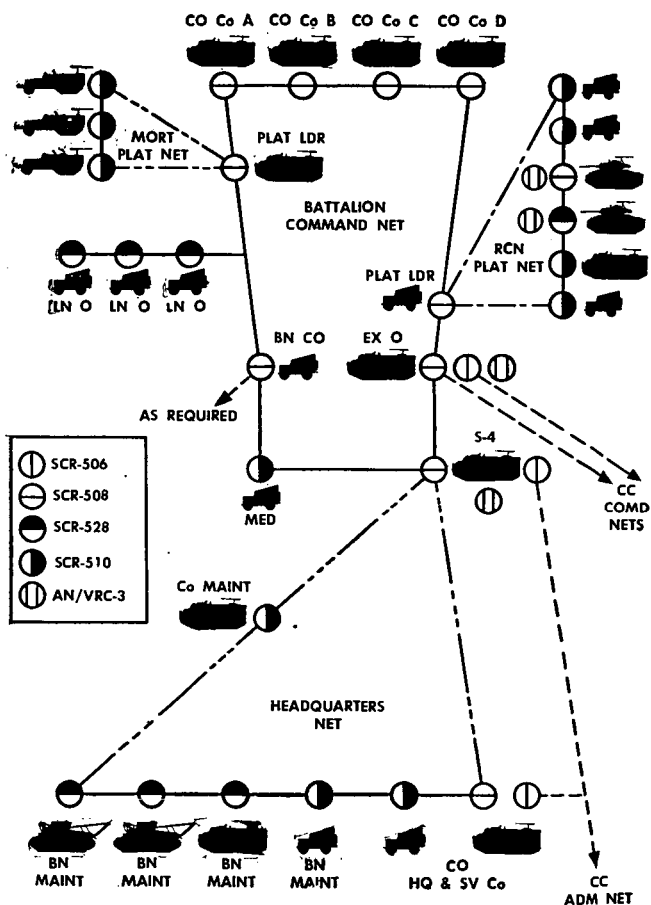


Figure 55. Typical radio nets, armored infantry battalion, mounted.

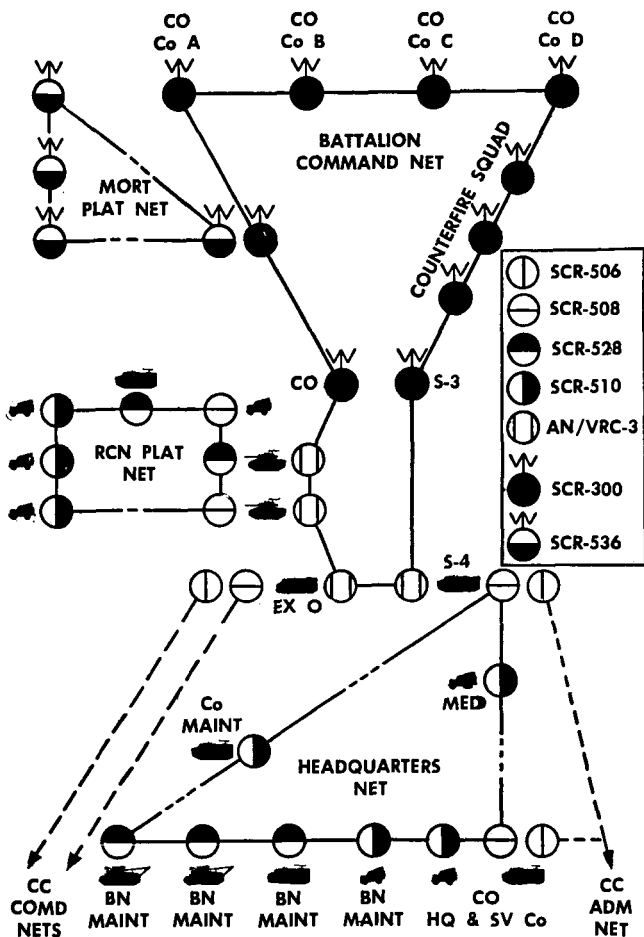


Figure 56. Typical radio nets, armored infantry battalion, dismounted.

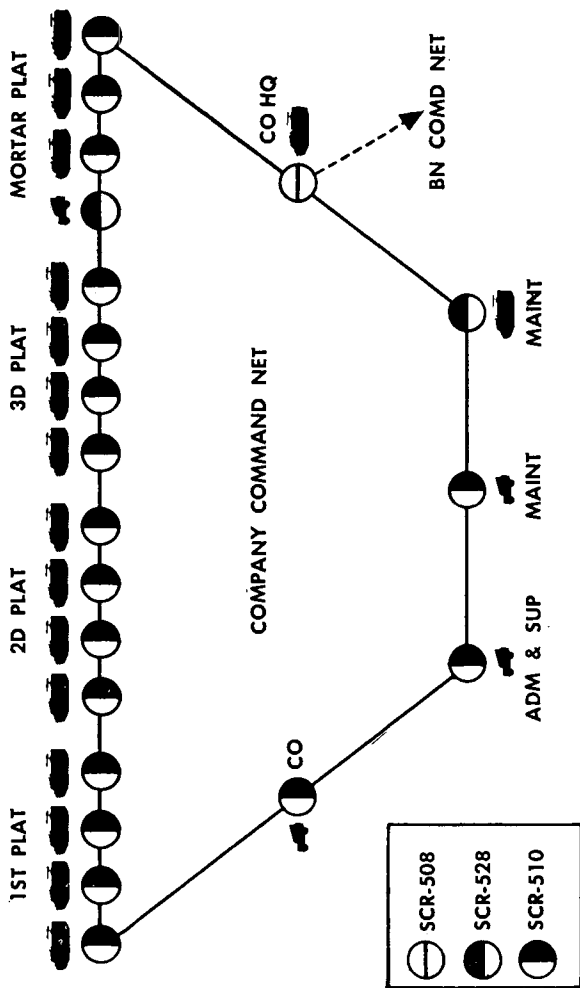


Figure 57. Typical radio net, rifle company, armored infantry battalion, mounted.

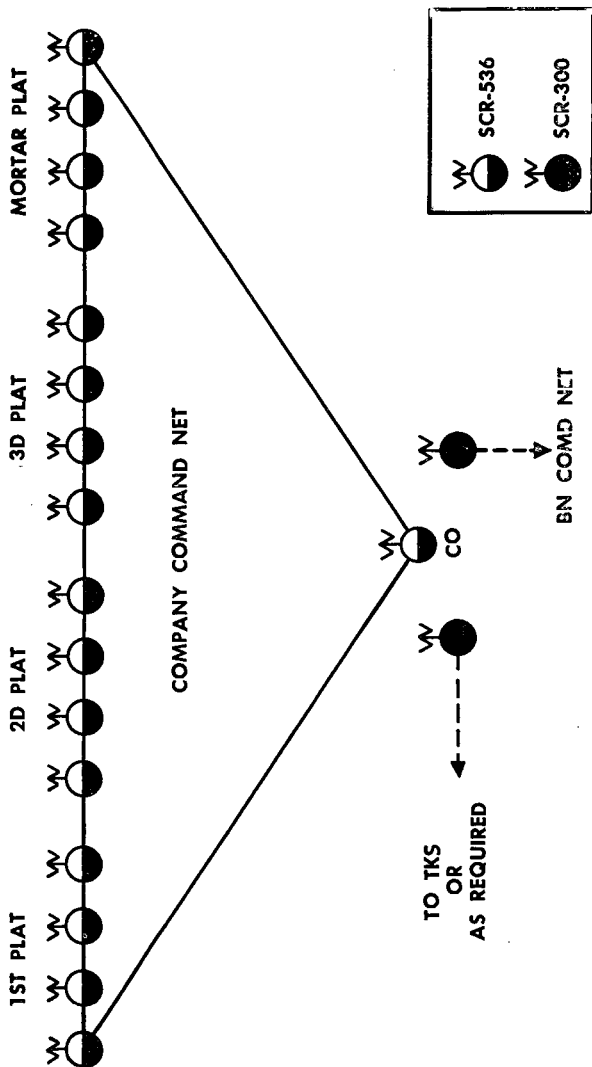
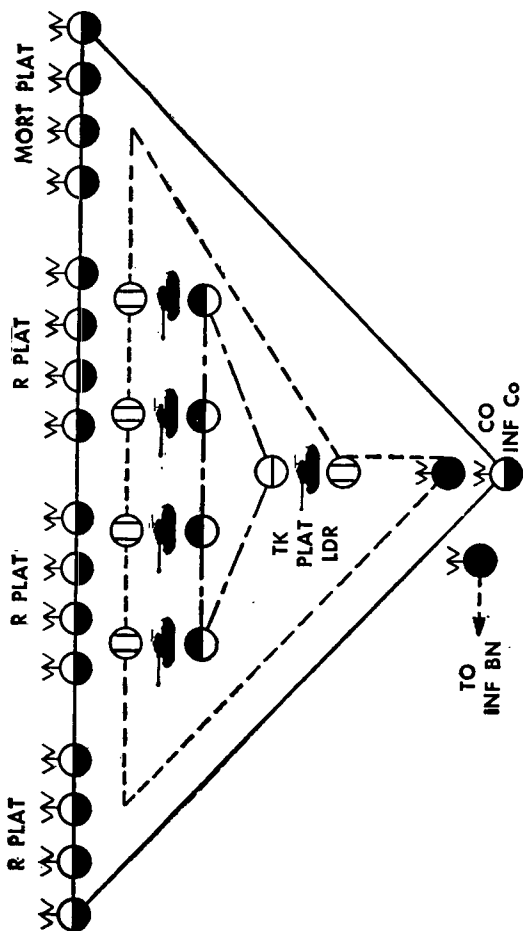


Figure 58. Typical radio net, rifle company, armored infantry battalion, dismounted.

321. INFANTRY-TANK COMMUNICATION. Each tank is equipped with a medium-power voice set which will net with vehicular radio sets used within the armored infantry battalion. There is, in addition, a low-power radio set in each tank which will net with portable ("walkie-talkie") voice radio sets in the company and battalion headquarters. Radio sets will be authorized in the future to replace the portable sets ("handie-talkie") so that all armored infantry company sets may be netted with tank radios. Basic radio nets are altered to fit the requirements of combined arms teams. Suggested nets for infantry-tank radio communication using currently authorized equipment are shown in figure 59. Each tank also is equipped with an external connection to the tank interphone system; this allows the individual infantryman to communicate with the tank crew by using the handset and control box mounted on the rear of the tank.

322. ARMORED INFANTRY BATTALION WIRE COMMUNICATION—GENERAL. a. Wire communication is used within the armored infantry battalion to augment radio and other means whenever its use is practical. It is used extensively within the battalion during dismounted defensive operations. The basic wire systems of the armored infantry battalion are shown in figures 60 and 61. These systems are altered or expanded to support the tactical plans of the commander.

b. The armored infantry battalion is charged with the installation, operation, and maintenance of the battalion wire system. No wire teams are



HEAVY TANK PLATOON
 ATTACHED TO AN ARMORED
 INFANTRY COMPANY, DISMOUNTED.

Figure 59. Suggested radio nets for armored infantry-tank communication.

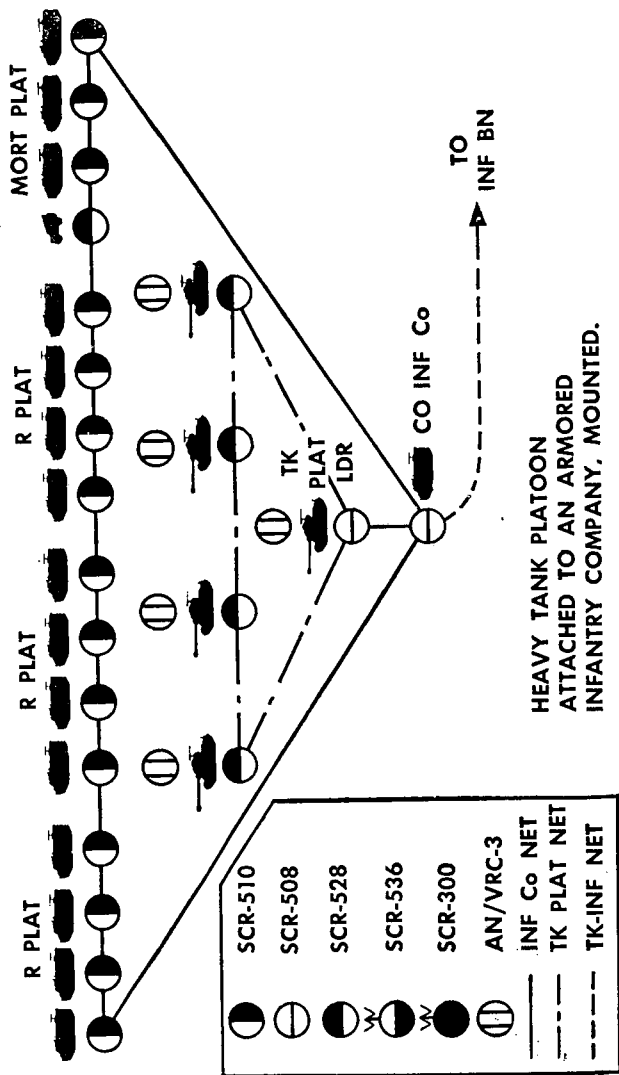


Figure 59. Suggested radio nets for armored infantry-tank communication—Continued.

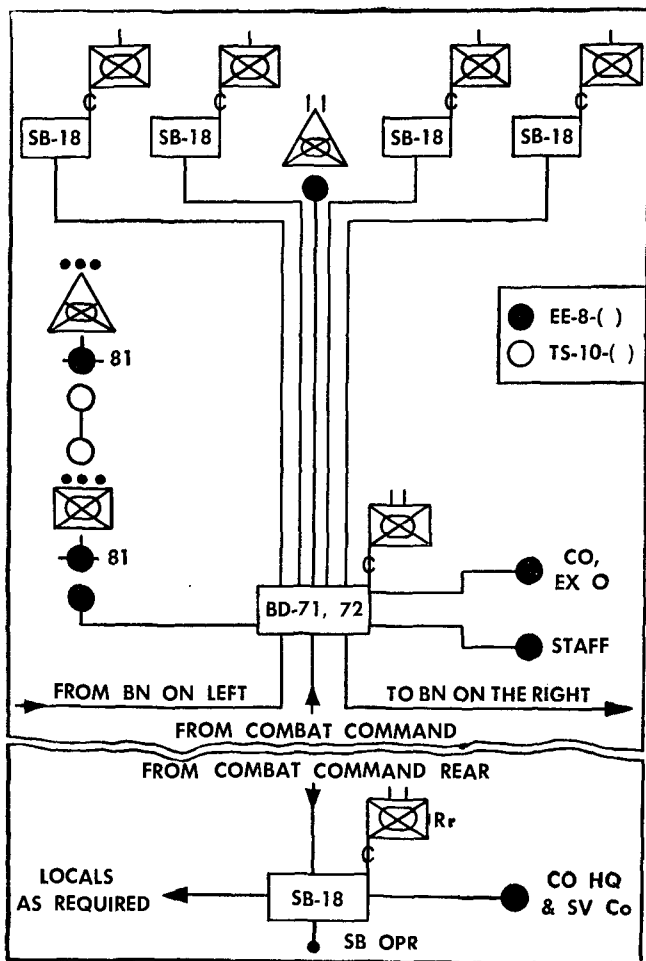


Figure 60. Typical wire system, armored infantry battalion.

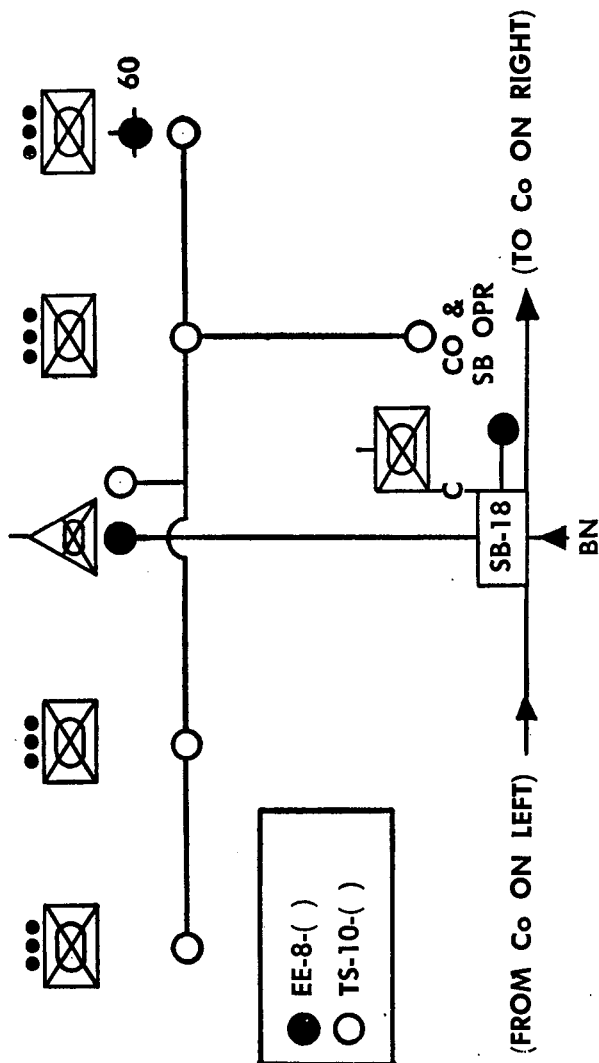


Figure 61. Typical wire system, rifle company, armored infantry battalion.

authorized for the battalion; therefore, personnel required for the installation of wire must be obtained from among other communication personnel of the battalion. The communication officer has available the battalion communication chief and the headquarters and service company communication sergeant, either one of whom may act as the battalion wire chief. Members of the wire teams may be message center personnel, radio operators, and other communication personnel not required for other duties at that particular time.

Section III. COMMUNICATION DURING MARCHES AND IN BIVOUAC, ARMORED INFANTRY BATTALION

323. COMMUNICATION DURING MARCHES—GENERAL. During marches, radio is the principal means of signal communication within the battalion. However, in order to maintain security, marches often will be made under listening silence. Control is extremely difficult under these conditions. The methods used to maintain this control are extensive prior planning, thorough briefing of all personnel, use of an adequate unit standing operating procedure (SOP), and continuous command liaison and supervision.

324. RADIO COMMUNICATION DURING MARCHES, ARMORED INFANTRY BATTALION. During marches, little use is made of the portable radio sets. All mounted radio nets are operated except during periods of listening silence. The battalion command post should be located in the column so that

contact can be kept with all elements. Failing this, arrangements must be made for establishing relay stations. During periods of listening silence, users of vehicular radio sets monitor their proper channels, prepared to resume operation when listening silence is lifted.

325. VISUAL COMMUNICATION DURING MARCHES, ARMORED INFANTRY BATTALION. Arm and hand signals during daylight, and light signals during darkness, are used extensively for column and individual vehicle control during a march. Each vehicle commander must be alert at all times to receive and pass on such signals to the succeeding vehicles in the column.

326. MESSENGER COMMUNICATION DURING MARCHES, ARMORED INFANTRY BATTALION. When radio communication is available, only limited use is made of messengers during a march, because of the difficulties and hazards in passing tanks and other heavy vehicles. Messengers are used for necessary scheduled runs and local services during halts. The message center vehicle should be marked plainly to aid its location by incoming messengers. A planned use of scheduled messengers will facilitate the handling of tactical and administrative traffic and will reduce the number of special messengers required.

327. ARMORED INFANTRY BATTALION LIAISON DURING MARCHES. The battalion establishes and maintains liaison with the preceding unit; each

company of march unit establishes and maintains liaison with the unit preceding it. This liaison is accomplished by the liaison officers and the company bugler-liaison agent.

328. RADIO COMMUNICATION IN BIVOUAC, ARMORED INFANTRY BATTALION. Radio communication in bivouac is similar to that used by the tank battalion (par. 279). Except for certain warning nets which may be necessary, radio stations usually will be under listening silence or restricted while the battalion is in bivouac.

329. MESSENGER COMMUNICATION IN BIVOUAC, ARMORED INFANTRY BATTALION. Each company sends a messenger, or its bugler, as a liaison agent to the battalion command post, and the battalion sends a messenger or a liaison officer, or both, to the next higher headquarters.

330. WIRE COMMUNICATION IN BIVOUAC, ARMORED INFANTRY BATTALION. During bivouac, the combat command often will construct a wire line to the armored infantry battalion command post. This line is connected to the battalion switchboard, and local lines are constructed to the commander and the staff sections. If time is available for the construction and use of the system, telephone lines are laid to the rifle companies. In bivouac, all elements of the battalion will be in close proximity to each other, making the construction of wire lines within the battalion comparatively easy. If the battalion headquarters rear

echelon is part of the combat command trains, wire communication to it is obtained through the combat command switchboards.

Section IV. PREPARATION FOR THE ATTACK, ARMORED INFANTRY BATTALION

331. PLANNING FOR COMMUNICATION. The communication officer assists the commander and staff in planning for the attack. He keeps informed of the tactical situation, including current and contemplated grouping of combined arms teams. He establishes a communication system to provide adequate communication within the battalion and between the battalion and adjacent units. He insures that current signal orders, together with any special prearranged signals or codes, are disseminated to all units of the battalion and to attached units. He maintains close liaison with the combat command communication officer and coordinates all communication plans and activities with the battalion commander and staff officers concerned. He may be required to make plans for the use of air support and to provide communication facilities as required by the forward air controller.

332. ARMORED INFANTRY BATTALION LIAISON DURING PREPARATION FOR THE ATTACK. Liaison is exceedingly important during the preparation for an attack. The battalion maintains a liaison officer at higher headquarters. Liaison is particularly important between the tank and infantry company

commanders and platoon leaders, and between infantry squad leaders and tank commanders. It is through liaison that all final plans for the attack are made.

333. RADIO COMMUNICATION DURING PREPARATION FOR THE ATTACK, ARMORED INFANTRY BATTALION. Basic radio nets are altered to support the tactical organization and plan. Attached units operating directly under battalion control report into the battalion command nets. Units operating under company control report into the company command net. Radio transmissions are kept to a minimum. When security conditions permit, all nets are test-operated for a short period to check equipment and operating personnel. It is of particular importance that all portable radio sets be checked and pretuned to operating frequencies prior to the attack. Vehicular radio sets, including those of attached tanks which are to net with the portable sets, must receive the same checks.

334. WIRE COMMUNICATION DURING PREPARATION FOR THE ATTACK, ARMORED INFANTRY BATTALION. Wire is a valuable means of communication between units during the preparation for the attack. It should be installed if time permits. It rarely is installed below company level during this period.

335. ARMORED INFANTRY BATTALION COMMAND POST DURING PREPARATION FOR THE ATTACK. The commander and each staff section must have a representative with the command post at all times

to insure that they will receive and act upon last-minute orders and instructions. The command post displaces in accordance with the battalion standing operating procedure.

336. ARMORED INFANTRY BATTALION SIGNAL SUPPLY AND MAINTENANCE IN PREPARATION FOR THE ATTACK. The communication officer, in conjunction with the S-4, formulates and executes supply plans that will place needed items of signal equipment in the hands of using troops. Organizational maintenance is continued.

Section V. COMMUNICATION DURING THE ATTACK, ARMORED INFANTRY BATTALION

337. GENERAL. The success of an attack is, to a great extent, dependent upon the efficiency of the communication system. After the attack has been launched, orders usually are fragmentary and often may be issued by radio. While radio is the principal means of communication, it must be supplemented by other means.

338. ARMORED INFANTRY BATTALION COMMAND POST DURING THE ATTACK. The battalion command post remains mobile during the attack and follows the command group closely enough to maintain communication with the commander, the forward elements, and higher headquarters. Communication between echelons of the headquarters normally is maintained by radio and messenger.

Radio contact between these echelons normally is maintained on the headquarters net to prevent overloading of the command net.

339. ARMORED INFANTRY BATTALION LIAISON DURING THE ATTACK. Battalion liaison officers remain at higher headquarters and adjacent units and keep the battalion headquarters informed of any new plans or developments. Each company will keep a liaison agent at battalion headquarters.

340. RADIO COMMUNICATION DURING THE ATTACK, ARMORED INFANTRY BATTALION. All mounted radio nets operate during the attack. Dismounted radio nets are established when the battalion dismounts to fight. If the attack is launched under listening silence, all radio sets are manned and ready for operation. Receivers are tuned to their proper channels and monitored constantly. Listening silence normally is lifted when enemy contact is made. The principles of radio discipline and procedure must be followed strictly in order to insure that the radio nets can carry the heavy traffic load occasioned by the attack. During the attack, the bulk of all voice radio messages will be sent in the clear, but messages are not transmitted indiscriminately in the clear. If messages are transmitted in the clear, they are worded so as to give as little information as possible to the enemy. Locations of friendly forces are encoded in map coordinate codes. During the attack, the mounted radio nets operate as necessary in the vehicle assembly area. At least one vehicle from each com-

pany maintains a listening watch on its company's command net.

341. WIRE COMMUNICATION DURING THE ATTACK, ARMORED INFANTRY BATTALION. Wire seldom is used in the armored infantry battalion during the attack. If a situation arises in which it is desirable to construct wire circuits during an attack, the battalion communication officer usually will find it necessary to obtain additional wire personnel and equipment.

342. VISUAL COMMUNICATION DURING THE ATTACK, ARMORED INFANTRY BATTALION. Arm and hand signals are used extensively within the armored infantry companies and platoons, and between these units and tanks, for the transmission of short control messages. Lights and colored smoke are used for identifying and marking targets and positions. Smoke and panels are used for identification to friendly aircraft and to mark front-line positions.

Section VI. COMMUNICATION DURING REORGANIZATION AND DURING EXPLOITATION, ARMORED INFANTRY BATTALION

343. COMMUNICATION DURING REORGANIZATION. During reorganization, all means of communication used during the attack are continued in operation. Necessary repairs and changes are effected in the communication system. If units are regrouped, the required changes are made in tuning

and netting of radio sets. Every effort is made to repair or replace faulty communication equipment and to resupply such items as radio tubes and batteries. Wire communication is installed during this period if sufficient time is available.

344. COMMUNICATION DURING EXPLOITATION.

During the exploitation, there must be reliable and effective methods of communication between the infantry and the tanks for both mounted and dismounted infantry action. To achieve this high degree of reliable and effective communication requires the use of radio, visual, and messenger communication.

345. ARMORED INFANTRY BATTALION COMMAND POST DURING THE EXPLOITATION.

The battalion command post normally operates on the move during exploitation. Communication personnel are organized into shifts so that necessary rest may be obtained. The movement and use of messengers are carefully controlled to prevent their employment in areas not clear of enemy troops. If it becomes necessary to send a messenger through doubtful areas, he should be informed of the situation and instructed in the security measures to be observed in the event of capture. The use of double messengers may be desirable under such circumstances.

346. ARMORED INFANTRY BATTALION LIAISON DURING EXPLOITATION.

Command liaison is maintained between commanders on all levels of the

armored infantry-tank team. If the infantry are riding on tanks, the infantry platoon leader rides the tank platoon leader's tank, and the infantry company commander rides the tank company commander's tank.

347. RADIO COMMUNICATION DURING EXPLOITATION, ARMORED INFANTRY BATTALION.

Radio nets in operation during the exploitation are similar to those used during the attack. Provision is made for relay stations if distances between units become too great to permit direct radio communication. Each unit must have a plan for the continuation of radio communication in the event that key radio vehicles are lost. If the infantry are riding on the tanks, they carry their portable radio sets with them. Under this condition, the infantry company commander and platoon leaders may use the tank radio sets for communication with their company vehicles or with the armored infantry battalion commander. The dismounted armored infantry portable radio sets are netted with tank radio sets. (See fig. 59.) While dismounted, the infantryman may talk directly to the tank commander or tank crew over the external tank interphone. This may be used in pointing out targets to the tank commander or for other purposes, as required. Methods for maintenance and operation of the radio communication system are similar to the methods employed within the tank battalion (par. 296).

348. WIRE COMMUNICATION DURING EXPLOITATION, ARMORED INFANTRY BATTALION. Wire rarely

is used within the armored infantry battalion during the exploitation. If the battalion halts during the hours of darkness, it is likely that the combat command will construct a telephone line to battalion headquarters if the distance is not too great.

349. VISUAL COMMUNICATION DURING EXPLOITATION, ARMORED INFANTRY BATTALION. Arm and hand signals are used extensively within the infantry companies and platoons, and between the infantry and tanks. Colored smoke grenades and tracer ammunition are used for target designation and the marking of positions. Vehicular panels are used for identification of vehicles and forward positions to friendly aircraft.

Section VII. PREPARATION FOR THE DEFENSE AND COMMUNICATION DURING THE DEFENSE, ARMORED INFANTRY BATTALION

350. PLANNING FOR COMMUNICATION. The communication system is planned to support the tactical plan. The communication system in a mobile defense will be similar to that employed in the attack. However, any wire system which is installed may be expanded to include the company headquarters, outposts, and observation posts. The employment of the battalion in a sustained defense will require use of a greater amount of wire equipment than normally is authorized the unit. Planning should include the actions necessary to obtain the additional equipment required for this type of operation. Details pertaining to communi-

cation are coordinated with higher, adjacent, and subordinate units. Alternate means of communication always are provided.

351. COMMUNICATION DURING THE DEFENSE. Any unit in the armored division, regardless of its tank or infantry strength, may be ordered to defend a sector within the division area. The armored division may adopt either the mobile defense or the sustained defense.

a. The armored infantry battalion normally will be employed in the mobile type of defense. This type of defense is based on the establishment of an outpost system and a strong mobile reserve. The outpost system is composed of observation posts (listening posts at night) and strong points of varying strength. The mission of these strong points is to stop, delay, and harass the enemy until he can be counterattacked by the mobile reserve. The observation posts and listening posts are sent out from the strong points with the mission of observing enemy activities and reporting these activities to the proper headquarters, and of directing artillery fire. In order that the observation posts and strong points cover all critical terrain and avenues of approach, it frequently is necessary that they be located a considerable distance from the actual area to be defended. In establishing this type of defense, radio is the principal means of communication used. Because of the possibility of strong points being separated by considerable distances, radio sets must be lo-

cated in positions which will insure adequate transmission range.

b. Upon occasion, the armored infantry battalion will be employed in the sustained defense. As compared to the mobile defense, the sustained defense envisages less maneuver within the defensive position. The armored infantry battalion will dig in, establish mutually supporting squad, platoon, or company areas, and be prepared to fight in any direction. Wire becomes an important factor in the communication system used in the sustained defense. As the defensive position is improved, the wire system is improved and expanded.

352. ARMORED INFANTRY BATTALION COMMAND POST DURING DEFENSE.

a. Regardless of the type of defense in which the armored infantry battalion is to be employed, certain command post problems apply. Alternate command post locations are selected and prepared for occupation; communication facilities are installed and located so as to prevent or reduce possibility of damage from enemy fires; nonessential vehicles are dispatched to the rear; and messengers are used extensively to maintain security and to prevent overloading of radio nets and any wire circuits which may be constructed.

b. During the mobile defense, command posts will be prepared for immediate movement, and no communication facilities will be employed which will hinder rapid movement. Normally, no wire will be installed within the command post.

Messengers will be used to carry messages within the command post.

c. Inasmuch as the sustained defense envisages less maneuver than the mobile defense, the defensive positions are more stable, and the communication system designed to support this defense can be more elaborate. Within the command post, wire normally will be laid to the commanding officer and the members of his staff. In addition, direct lines may be laid to critical outposts or listening posts. Radios normally will be used only when wire fails or when it is not practicable to construct wire lines to certain positions.

353. RADIO COMMUNICATION DURING THE DEFENSE, ARMORED INFANTRY BATTALION.

a. During a mobile defense, radio normally will be used in preference to wire. The armored infantry battalion commander maintains contact with the battalion reserve, subordinate elements, and the elements of the battalion headquarters and service company, as well as with any selected elements of the outpost system. If any one element of the battalion has more outposts than can be equipped with the available radio equipment, the communication officer will have to procure additional sets from the division signal officer or redistribute certain radio sets within the battalion on a temporary basis. The battalion will operate in higher headquarters nets as directed. Within the battalion, the battalion command net is used to carry the bulk of the traffic. Messengers are used to lighten the traffic load on the command net, and to provide

security. Security is of paramount importance during the defense, because the enemy may have sufficient time to act on any information he may receive from opponent's transmissions. The best radio security is radio silence. Because this often is not practicable within the armored division, all precautions must be taken to insure correct procedure, minimum transmissions, and use of encrypted messages.

b. When the armored infantry battalion is employed in a sustained defense, radios normally will be used only when wire lines are inoperative or impractical to construct. Radio communication is replaced rapidly by wire communication as wire lines are constructed. However, any mounted or mobile elements still will rely upon radio. The battalion will operate in higher headquarters nets as directed. If wire communication is available to higher headquarters, the combat command administrative net normally will be closed, and operation will be required only on the combat command command net. In this case, the command net will act only as a warning net. The radiotelegraph-telephone command net will be operated between the battalion and the combat command only when contact is lost on the parallel voice radio command net. When wire communication has been established between the battalion and its subordinate elements, the battalion command net normally will be used only for emergency transmission, or to maintain continuous contact with subordinate units when wire communication fails.

354. WIRE COMMUNICATION DURING DEFENSE, ARMORED INFANTRY BATTALION.

a. In a mobile defense, because of the distances and the movement involved, wire rarely will be used. Occasions may arise when it will be advantageous to construct wire lines to some particularly important outpost or strong point.

b. In a sustained defense, a wire system similar to that shown in figures 60 and 61 is installed. As time permits, the system will be expanded to provide adequate wire facilities between all elements. Lateral lines will be laid between battalion elements and adjacent units, and alternate lines will be laid to all units. In the defense, much time will be spent repairing lines between the battalion and the companies. Communication officers should take into consideration the amount of repair work required to keep a wire installation in operation before they make any plans for expanding that system.

CHAPTER 7

RECONNAISSANCE BATTALION

Section I. GENERAL

355. GENERAL. The reconnaissance battalion performs missions of security and reconnaissance for higher echelons, normally by independent action. Combat missions may be given the reconnaissance battalion whenever a light armored unit is deemed appropriate and desirable for such missions. The capabilities of this battalion make it especially useful as a nucleus about which a team of combined arms may be formed by the attachment of reinforcements suitable to the mission.

356. RECONNAISSANCE BATTALION STANDING OPERATING PROCEDURE. The standing operating procedure (SOP) for the reconnaissance battalion is a set of uniform standardized methods, procedures, and techniques established by the commander as a guide for the performance of all contemplated operations that can be standardized without loss of effectiveness. The battalion SOP will conform to the division SOP. The signal communication portion of the battalion SOP is prepared by the battalion communication officer and is submitted to the battalion commander for approval.

357. RECONNAISSANCE BATTALION SIGNAL OPERATION INSTRUCTIONS. Signal operation instructions (SOI) are a type of combat order issued for the technical control and coordination of signal and communication agencies of a command. The SOI of the division are prepared by the division signal officer in sufficient quantity for distribution as required within the battalion. In special situations, additional brevity codes, map coordinate codes, and prearranged message codes may be prepared by the battalion communication officer to conform to the instructions contained in the division standing signal instructions (SSI).

Section II. ORGANIZATION, RECONNAISSANCE BATTALION

358. GENERAL. The reconnaissance battalion (T/O&E 17-45N) is composed of a headquarters, headquarters and service company; four reconnaissance companies; and a medical detachment (fig. 62). The headquarters and service company (T/O&E 17-46N) contains the necessary headquarters and service elements for administering the battalion (fig. 63). Each reconnaissance company (T/O&E 17-57N) contains a company headquarters and three reconnaissance platoons (fig. 64).

359. RECONNAISSANCE BATTALION COMMUNICATION FACILITIES. Radio is the principal means of communication within the battalion. Wire, messenger, sound, and visual communication supple-

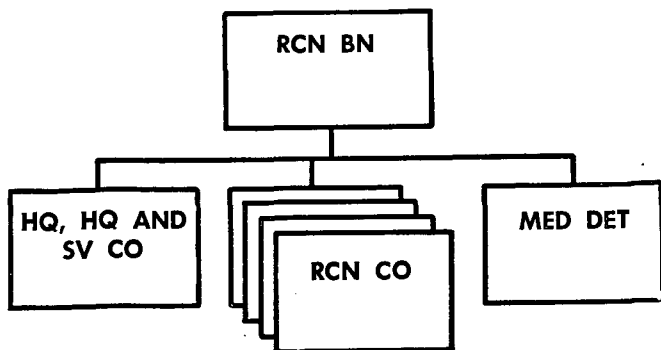


Figure 62. Organizational chart, reconnaissance battalion.

ment radio communication. Communication personnel are provided for the operation of these means.

360. RECONNAISSANCE BATTALION COMMUNICATION EQUIPMENT. Sufficient communication equipment is provided to insure adequate communication within the battalion, and between the battalion and other units, for normal operation. This equipment falls generally into three types: radio, wire, and visual.

361. RECONNAISSANCE BATTALION RADIO EQUIPMENT. The radio equipment consists of radio sets and associated equipment, together with the equipment necessary for organizational maintenance and repair. Medium-power radiotelegraph-telephone sets provide communication between the battalion and higher headquarters, and from the battalion to its companies. Medium-power voice

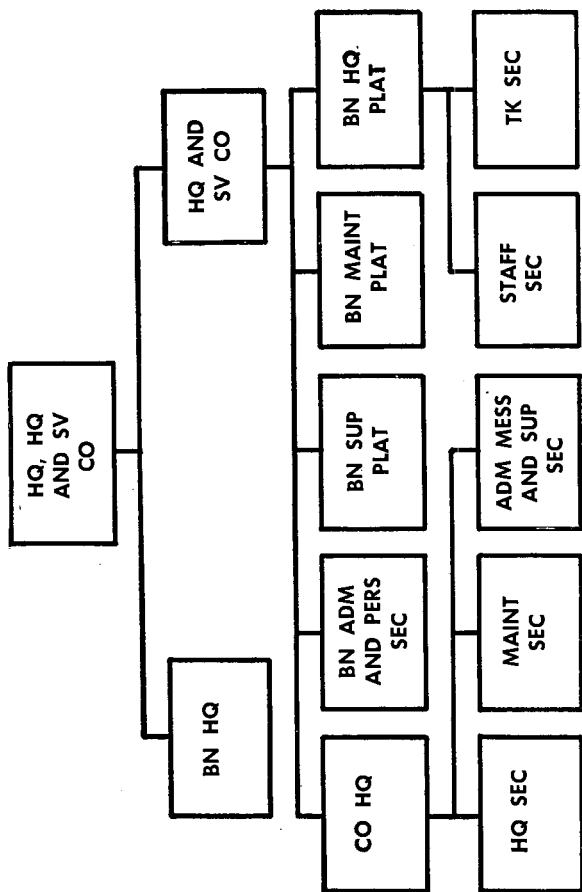


Figure 63. Organizational chart, headquarters, headquarters and service company, reconnaissance battalion.

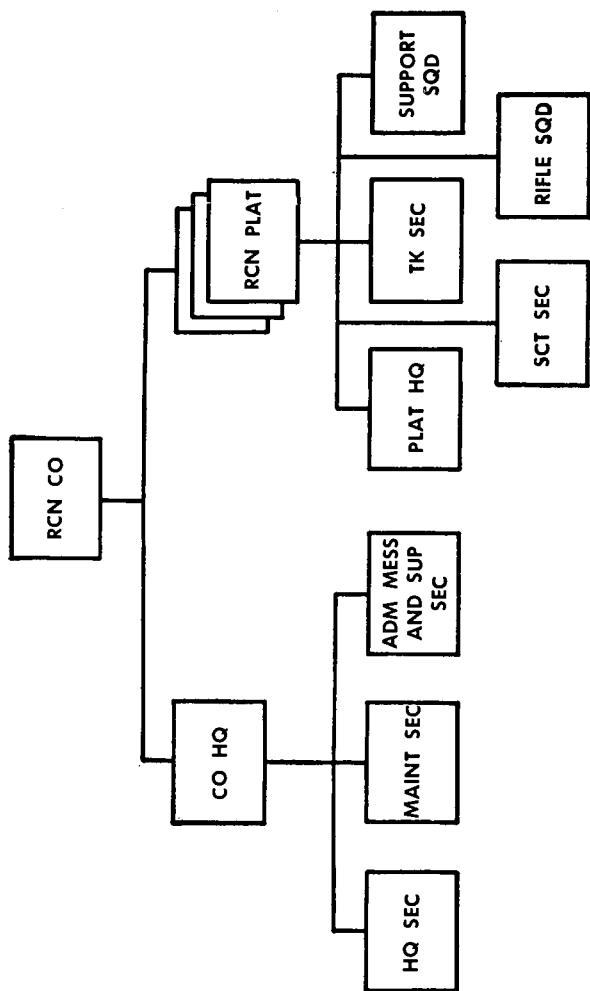


Figure 64. Organizational chart, reconnaissance company.

sets provide an additional channel of communication from the battalion to its companies. Medium- and low-power voice sets provide communication within the companies. Further, the reconnaissance battalion is provided with a medium-power voice set capable of netting with aircraft radios for the purpose of communicating with supporting aircraft.

362. RECONNAISSANCE BATTALION WIRE EQUIPMENT. The wire equipment consists of switchboards, telephones, field wire, and wire construction and maintenance equipment. Both battery and sound-powered telephones are authorized for the battalion.

363. RECONNAISSANCE BATTALION VISUAL EQUIPMENT. The visual communication equipment consists of flags, panels, and pyrotechnics. Flag sets and vehicular panel sets are issued to all armored and certain other vehicles in the reconnaissance battalion. Additional panel sets, designed for signaling, are issued to the battalion headquarters for emergency ground-to-air communication. Pyrotechnics, including signal flares and colored smoke, are used for signaling between elements. Pyrotechnics also are used for marking front lines and friendly positions. Arm and hand signals are used for column control and signaling between small units.

364. RECONNAISSANCE BATTALION COMMUNICATION PERSONNEL. The communication personnel

in the reconnaissance battalion include the communication officer, the battalion and company communication chiefs, the battalion and company radio repairmen, radio operators, code clerks, messengers, and the message center chief. Their duties are as prescribed in paragraphs 6-13.

Section III. ORGANIZATION FOR COMBAT, RECONNAISSANCE BATTALION

365. GENERAL. The reconnaissance battalion may operate under division control, or the battalion or part of the battalion may be attached to a combat command. Detachment of more than one company from the battalion should be avoided, as it seriously affects the operation of the battalion. The reconnaissance battalion is capable of absorbing attachments to form a combined arms team. The headquarters, like the division headquarters, will operate in two echelons, forward and rear, with a command group frequently operating out of the forward echelon (CP).

366. RECONNAISSANCE BATTALION COMMAND POST

—GENERAL. **a.** The command post of the reconnaissance battalion is supervised by the executive officer. It consists of the necessary personnel, vehicles, and communication equipment to facilitate control, by the commander and his staff, of over-all command and administrative functions of the battalion.

b. The commander, his staff officers or their representatives, and the necessary enlisted per-

sonnel required for command post operation normally are located at the command post.

c. The location of the battalion command post is prescribed by the battalion commander. Recommendations for its general location are made to the commander by the S-3, following consultation with the communication officer.

367. RECONNAISSANCE BATTALION LIAISON—GENERAL.

a. The battalion maintains liaison with higher headquarters and adjacent units. Each of the liaison officers in the reconnaissance battalion is mounted in a radio-equipped $\frac{1}{4}$ -ton truck. The liaison officers are representatives of the battalion commander. Each company maintains liaison with battalion headquarters or other units, as required, by means of organic liaison agents. Each liaison agent is mounted in a radio-equipped $\frac{1}{4}$ -ton truck.

b. The communication officer should maintain personal liaison with the division signal officer and the communication personnel of attached and adjacent units.

368. RADIO COMMUNICATION, RECONNAISSANCE BATTALION — GENERAL.

Radio is the principal means of communication in the reconnaissance battalion. Radiotelegraph operators are authorized for the medium-power radiotelegraph-telephone sets. All personnel, including officers, are trained to operate the voice radio sets.

369. RECONNAISSANCE BATTALION RADIO COMMUNICATION TO HIGHER HEADQUARTERS.

a. The *di-*

vision reconnaissance net (fig. 19) provides direct communication between the division G-2 and S-2's of the combat and reserve commands, the reconnaissance battalion command post, and other units as required. The radio of the division G-2 is the net control station. This net is used for the exchange of information pertaining to the enemy.

b. The *division command net* (fig. 18) is used for command and tactical control of units operating directly under division control. The net handles traffic pertaining to tactical operations. The station of the division G-3 is the net control station. The station of the reconnaissance battalion executive officer located in the command post is a secondary station in this net.

c. The *division administrative net (forward)* (fig. 20) is used for the purpose of exchanging administrative messages pertaining to supply, evacuation, and personnel. The radio station of the division G-4 is the net control station. The station of the reconnaissance battalion S-4 located in the command post is a secondary station in this net.

d. Air-ground communication is accomplished in two ways:

- (1) Liaison planes, organic to the division, use the same type voice radio sets as, and are capable of communicating with, ground units.
- (2) One very-high-frequency voice radio set, of the type installed in aircraft, is authorized for communication with supporting Air Force aircraft. It normally is operated by Air Force personnel attached

to the battalion for combat operations, as is the set employed in the combat command. For further information, see paragraph 205.

370. RECONNAISSANCE BATTALION COMMAND NETS.

a. The *battalion command net (voice)* (fig. 65) is used for direct radio command during fast-moving situations, particularly when the situation permits handling of traffic in the clear. The radio station of the battalion S-3 is the net control station. This net provides direct contact between the battalion commander and staff and all reconnaissance company commanders of the battalion.

b. The *battalion command net (C-W)* (fig. 66) parallels the battalion command net (voice) and is used for the same purposes. In addition, it is used for handling cryptographed messages, written messages that must be copied accurately, and all messages when the voice radio sets are out of range. The radio station of the battalion S-3 is the net control station.

371. RECONNAISSANCE BATTALION HEADQUARTERS

NET. Each armored vehicle and many unarmored vehicles of the battalion headquarters are authorized medium- or low-power voice radio sets. These sets operate together on a headquarters net (fig. 65). The radio station in the vehicle of the battalion executive officer usually is designated as the net control station. This net is used for intercommunication between staff sections during marches, and for communication between echelons of the headquarters.

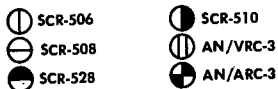
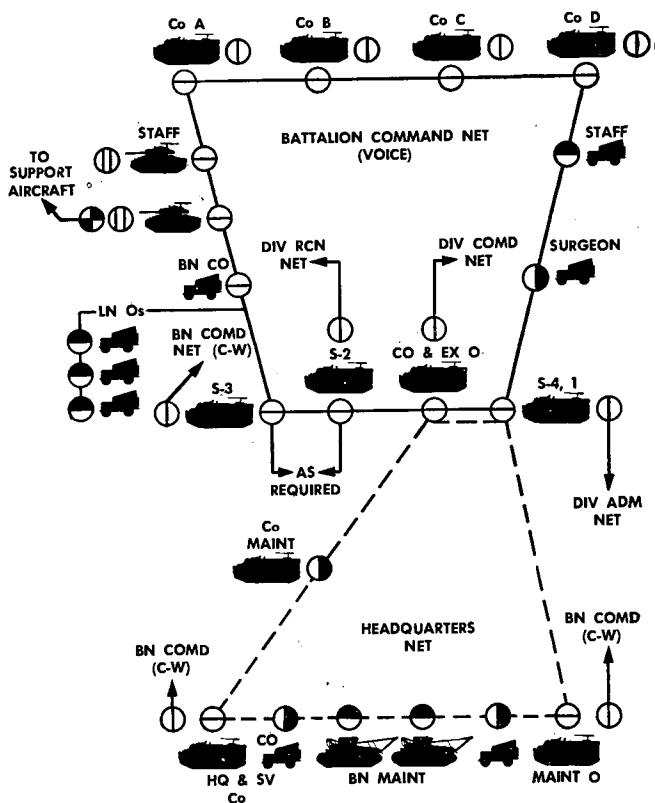


Figure 65. Typical radio nets, reconnaissance battalion (voice).

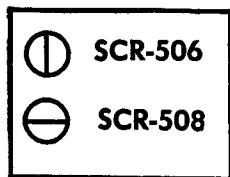
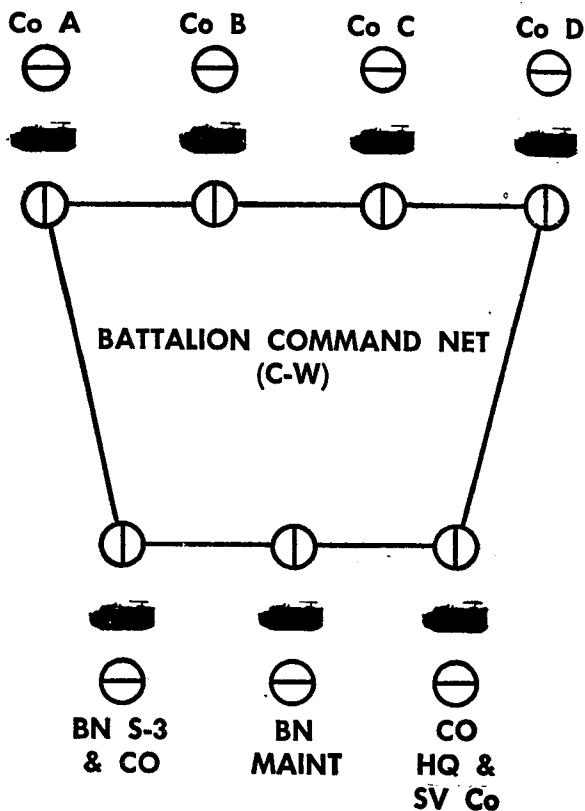


Figure 66. Typical radio net, reconnaissance battalion command net (C-W).

372. RECONNAISSANCE COMPANY COMMAND NET.

The *reconnaissance company command net* (fig. 67) is used for command and tactical control of the company. The station of the company commander is the net control station. This voice net provides direct communication between the company commander, the platoon leaders, and the company maintenance section.

373. RECONNAISSANCE PLATOON NET. The *reconnaissance platoon net* (fig. 67) provides communication between elements of the platoon. The platoon leader operates in both this net and the company command net.

374. RECONNAISSANCE BATTALION WIRE COMMUNICATION — GENERAL. Wire communication is used to supplement radio communication. It is installed when required. The wire system rarely is extended to maintain communication during movement. The use of wire communication depends upon the situation and the time available for construction. Figure 68 shows the basic wire system for the reconnaissance battalion. This system may be altered or expanded, consistent with the time, equipment, and personnel available.

375. RECONNAISSANCE BATTALION WIRE COMMUNICATION TO HIGHER UNITS. The next higher unit will construct wire lines to the reconnaissance battalion command post whenever wire is employed. The division may supply radio relay terminal equipment and the necessary operating personnel for additional communication in special situations. (See pars. 93 and 132.)

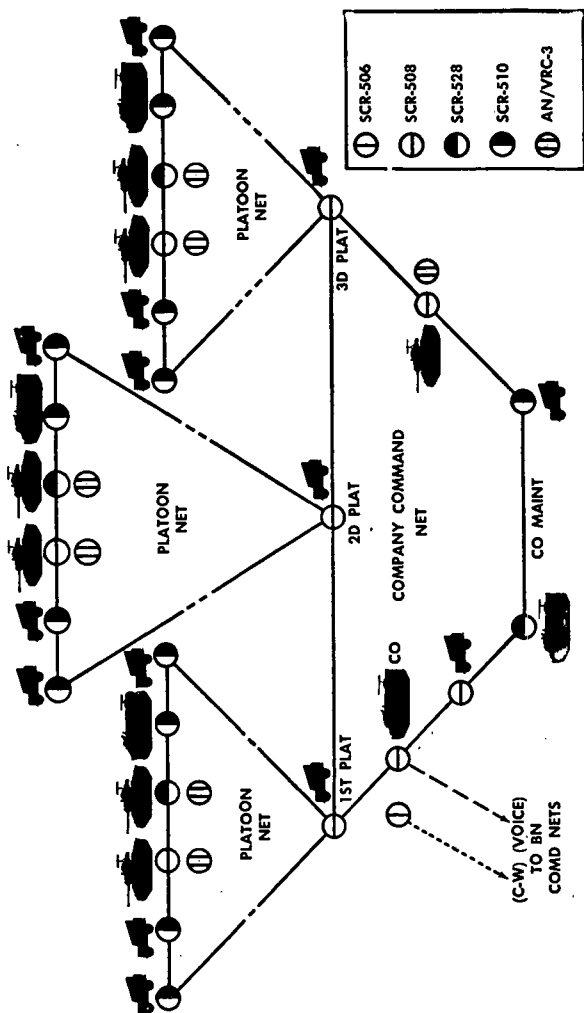


Figure 67. Typical radio nets, reconnaissance company.

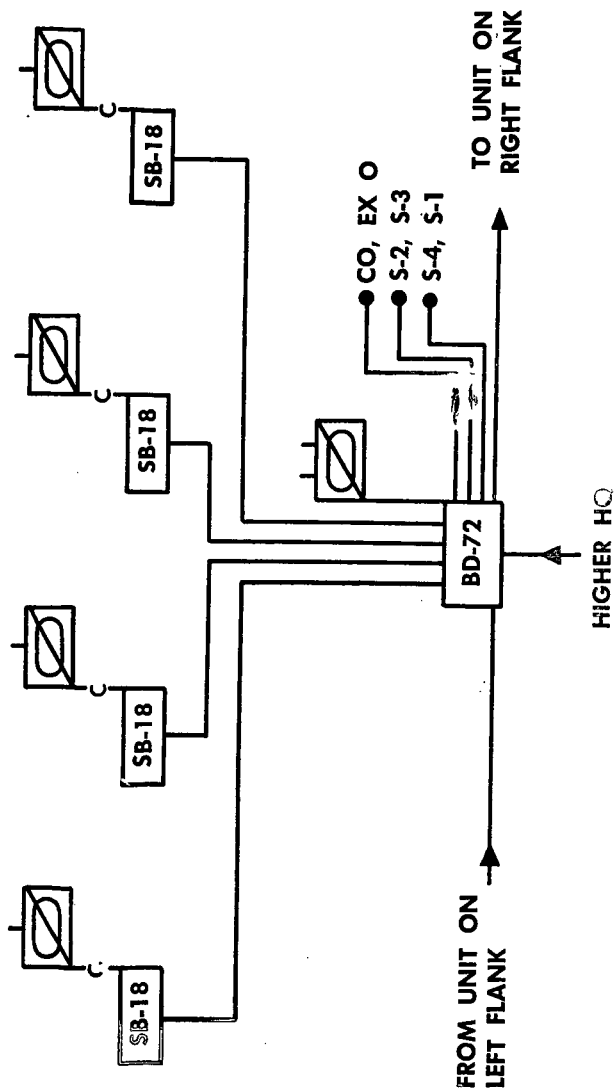


Figure 68. Typical wire system, reconnaissance battalion.

376. RECONNAISSANCE BATTALION LOCAL WIRE INSTALLATION.

The switchboard and local lines are installed by unit personnel. Communication personnel are trained to lay wire and operate the switchboard as secondary duties. Telephones are shared whenever possible, to reduce the amount of construction. Lines are placed so as to avoid destruction by moving vehicles or personnel. The switchboard is located in a position convenient to trunk and local lines, preferably in a covered position. It should be located so that it will be as safe as possible from enemy fire. The exact location of the switchboard depends upon the local situation and terrain. Often the switchboard may be located in a dugout or basement; if an adequate location is not available, it may be placed in an armored vehicle or a prepared fox hole. Operators must be alert, courteous, and efficient and must have complete knowledge of their wire network and telephone directory so that they can complete calls quickly and accurately.

Section IV. COMMUNICATION DURING MARCHES AND IN BIVOUAC, RECONNAISSANCE BATTALION

377. COMMUNICATION DURING MARCHES — GENERAL.

Unless listening silence is ordered, radio will be the principal means of communication used within all elements of the battalion during marches. During listening silence, control is maintained by the use of command liaison and supervision, and the use of visual and messenger communication. Good control can be insured only through extensive

prior planning, thorough briefing of all personnel, use of an adequate unit standing operating procedure, and continuous command liaison and supervision.

378. RADIO COMMUNICATION DURING MARCHES, RECONNAISSANCE BATTALION. During marches, radio nets are so established as to insure adequate control of the entire battalion. The battalion command nets are used to provide communication between the battalion headquarters and the companies. The march unit within the reconnaissance battalion normally is a company. Both battalion command nets usually will be operated. The voice net is used to control the march when distances are not excessive; the radiotelegraph-telephone net, which parallels the voice net, is used for the transmission of messages that must be cryptographed and for the transmission of all messages when distance precludes the use of voice radio sets. A well-planned and well executed march will not require frequent use of radio. To decrease the number of transmissions and to facilitate control, all radio sets of a reconnaissance company may be operated on the company channel. During periods of listening silence, all radio sets are manned with receivers on and the radio set ready for instant operation.

379. MESSENGER COMMUNICATION DURING MARCHES, RECONNAISSANCE BATTALION. Within the battalion headquarters, mounted messengers are detailed to follow command and staff vehicles in order to provide messenger service. The vehicle of

the battalion message center is plainly marked so that it can be located quickly by incoming messengers. Use of messengers is of particular importance during periods of listening silence. A planned use of scheduled messengers will facilitate the handling of routine tactical and administrative messages, and will reduce the number of special messengers required.

380. VISUAL COMMUNICATION DURING MARCHES, RECONNAISSANCE BATTALION. Arm and hand signals are used for column control whenever possible, in preference to radio communication. Vehicular panels are displayed in accordance with the division SOI. Pyrotechnic signals are kept in readiness for emergency use. Both panels and pyrotechnic signals are especially useful for identification to friendly aircraft.

381. RECONNAISSANCE BATTALION COMMUNICATION IN BIVOUAC—GENERAL. Listening silence often will be required of units in bivouac. If listening silence is not in effect, the use of radio should be restricted to emergency transmissions and messages necessary to the security of the unit. The reconnaissance battalion utilizes wire and messenger in preference to radio. The use of radio depends on the conditions of security and the probable employment of the unit. Liaison is maintained with higher headquarters and with adjacent units when deemed necessary.

382. RADIO COMMUNICATION IN BIVOUAC, RECONNAISSANCE BATTALION. a. If listening silence is not ordered, minimum transmissions are made,

and maximum use is made of the other means of communication. Normally, in bivouac, only one battalion radio net will operate; this will be a warning net established to maintain the security of the unit. This net normally will consist of one station from each company and stations located at outposts. Patrols will operate on their normal unit net.

b. Battalion radio stations in higher nets operate as directed by the net control stations. If radio communication is necessary, these nets often are consolidated in bivouac so that only one station is in communication with higher headquarters. If adequate wire communication is available, all radio nets may be closed.

c. Full use is made of remote control systems. Radio sets and remote control systems are utilized so that minimum personnel are required for operation.

383. MESSENGER COMMUNICATION IN BIVOUAC, RECONNAISSANCE BATTALION. Within the battalion command post, messengers operate under the direction of the message center chief. He will establish scheduled messenger service to units of the battalion. A reliable scheduled messenger service will restrict the use of special messengers to cases of extreme urgency.

384. WIRE COMMUNICATION IN BIVOUAC, RECONNAISSANCE BATTALION. Higher headquarters will construct wire lines to the reconnaissance battalion whenever the situation permits. The battalion

wire system is installed and operated by personnel of the battalion. Normally, this system will consist of a switchboard at the battalion command post, with lines to the companies and locals to the battalion commander and staff. Wire communication normally is not established within companies unless elements of the companies are separated from their headquarters or its use is desirable in the provisions for local security.

Section V. PREPARATION FOR THE ATTACK, RECONNAISSANCE BATTALION

385. PLANNING FOR COMMUNICATION. **a.** An adequate and efficient communication system requires not only equipment and trained personnel, but also thorough and constant planning. The communication officer is kept informed of all current operations and joins with the battalion commander and battalion staff members in planning for future operations. Details pertaining to communication are coordinated with higher, adjacent, and subordinate units. Provision for alternate means of communication must be included in the planning stage.

b. Once a plan has been adopted, all personnel concerned must be well-briefed in its operation. Each section, team, and individual concerned must fully understand the mission and the procedure to be employed in its accomplishment.

c. When the reconnaissance battalion is to operate over a wide area with an extended distance between its units, or between the battalion and the

division, plans should include a request for attachment of division liaison planes. These planes can be used profitably for command liaison, for transportation of liaison personnel and messages, and as intermediate radio stations.

386. RECONNAISSANCE BATTALION LIAISON DURING PREPARATION FOR THE ATTACK. The details of planning are coordinated by liaison with units concerned. Personal contact between the communication officer and higher, adjacent, and subordinate units is made whenever the situation and time permit. Each company maintains a messenger or liaison agent at the battalion headquarters forward echelon. Liaison should be continuous.

387. RADIO COMMUNICATION DURING PREPARATION FOR THE ATTACK, RECONNAISSANCE BATTALION. Available radio equipment and personnel are checked against the requirements for radio communication. Training and maintenance must be continuous. If radio communication requirements cannot be filled by available equipment or personnel, arrangements must be made for additional support. Radio sets and nets are tested by actual operation whenever the situation and the security conditions permit.

388. WIRE COMMUNICATION DURING PREPARATION FOR THE ATTACK, RECONNAISSANCE BATTALION. Wire communication is especially desirable during the planning stage and for as long thereafter as possible. Wire rarely is installed below company level during this phase.

389. RECONNAISSANCE BATTALION COMMAND POST DURING PREPARATION FOR THE ATTACK. The battalion command post is located as close to the line of departure as practicable. Radio, messenger, and often wire communication are provided between the forward and rear echelons of the headquarters. If preparation is made during listening silence, radio sets will be maintained ready for instant operation.

390. RECONNAISSANCE BATTALION SIGNAL SUPPLY AND MAINTENANCE IN PREPARATION FOR THE ATTACK. Signal maintenance is continuous, but is intensified during the preparation for attack. All equipment is rechecked, and defective equipment is repaired or replaced. Adequate signal supplies are obtained prior to the attack. Expendable supplies must be available to cover the probable period of the attack.

Section VI. COMMUNICATION DURING THE ATTACK, RECONNAISSANCE BATTALION

391. GENERAL. During the attack, radio necessarily is the principal means of communication. Listening silence may be in effect until initial contact has been made with the enemy. Movement normally will preclude the use of wire. Messenger and visual communication are used extensively until listening silence is lifted. After the attack has been launched, orders usually are fragmentary and usually are issued by radio.

392. RECONNAISSANCE BATTALION COMMAND POST DURING THE ATTACK. Communication between the echelons of the battalion headquarters is maintained by radio. Contact between these echelons normally is maintained on the headquarters net to prevent overloading the battalion command net. The battalion message center will operate at the forward echelon. Scheduled messenger runs are maintained whenever possible to handle routine tactical and administrative traffic.

393. RECONNAISSANCE BATTALION LIAISON DURING THE ATTACK. Liaison is maintained with higher headquarters and adjacent units. Each company will keep a liaison agent with the battalion headquarters. A company operating directly under combat command control normally will send an officer to combat command headquarters to act in a liaison capacity. Each liaison officer is provided with a radio set which he uses in his unit radio net or in the net of the unit to which he is sent. Liaison officers make use of other available means of communication as needed.

394. RADIO COMMUNICATION DURING THE ATTACK, RECONNAISSANCE BATTALION. a. In the attack, maximum use is made of radio. If the attack commences under listening silence, all radio sets are manned and ready for operation. Listening silence normally will be lifted when enemy contact is made. Efficient radio communication under these circumstances demands discipline and alertness from all concerned.

b. All battalion radio nets will be in operation during the attack. Messages are encrypted when necessary. The bulk of all voice radio messages, however, will be sent in the clear, but messages are not transmitted indiscriminately in the clear. The writer makes a separate decision as to how each message is to be transmitted. If the message is to be transmitted in the clear, it is worded so as to give as little information as possible to the enemy. Locations of friendly forces are encoded by use of map coordinate codes.

c. A reconnaissance company may be detached from the reconnaissance battalion and attached to a combat command or similar unit. The company commander of such a unit will report out of the reconnaissance battalion command nets and into the command nets of the unit to which attached. (See fig. 30.)

395. WIRE COMMUNICATION DURING THE ATTACK, RECONNAISSANCE BATTALION. Wire communication is maintained until the forward echelon of the headquarters moves forward. Whether or not wire communication is to be installed or extended after movement is dependent upon the situation. Wire is not installed unless sufficient time is available to construct the lines and allow operation.

396. VISUAL COMMUNICATION DURING THE ATTACK, RECONNAISSANCE BATTALION. Arm and hand signals are used for column control in preference to radio. Vehicular panels are displayed as designated in the SOI for identification to friendly aircraft.

Section VII. COMMUNICATION DURING REORGANIZATION AND DURING EXPLOITATION RECONNAISSANCE BATTALION

397. COMMUNICATION DURING REORGANIZATION.

During reorganization, all means of communication used during the attack are continued in operation. The communication officer effects repairs and improvements in the communication system, and makes recommendations for changes incident to the next operation. Every effort is made to repair or replace faulty communication equipment and to resupply such items as radio tubes, fuses, and batteries. Wire communication is installed during this period if sufficient time is available.

398. COMMUNICATION DURING EXPLOITATION.

Radio is the principal means of communication during exploitation. All communication personnel must be kept informed of the contemplated tactical organization. Prior planning must be so complete that any changes in tactical organization will not affect communication seriously for any extended period of time. The channels on the medium-power voice radio sets must be preset to net with units with which the reconnaissance battalion might operate during this phase.

399. RECONNAISSANCE BATTALION COMMAND POST DURING EXPLOITATION.

The reconnaissance battalion headquarters normally operates in two echelons. Communication personnel are used in shifts, whenever possible, in order that necessary

rest may be obtained. The movement and use of messengers is controlled carefully to prevent their employment in areas not clear of enemy troops. If it becomes necessary to send a messenger through doubtful areas, he should be informed of the situation, and instructed in the security measures to be observed in the event of capture. The use of double messengers may be desirable under such circumstances.

400. RECONNAISSANCE BATTALION LIAISON DURING EXPLOITATION. Liaison is continued during the exploitation phase. Normal channels of communication are used. Although liaison officers are assigned their own vehicles, consideration should be given to the possibility of furnishing them with armored vehicles or liaison planes for transportation.

401. RADIO COMMUNICATION DURING EXPLOITATION, RECONNAISSANCE BATTALION. Full use is made of radio communication during this phase of an operation. Provision is made for the use of relay stations when distances between elements become so great that they interfere with the operation of the radio sets. These relay stations may be either vehicular radio sets or radio sets operating from liaison planes. During the exploitation, the units of the reconnaissance battalion must, in many cases, rely upon radio communication more than any other unit in the armored division.

402. WIRE COMMUNICATION DURING EXPLOITATION, RECONNAISSANCE BATTALION. Wire com-

munication seldom can be used during the exploitation. If the battalion is to halt during the hours of darkness, it is likely that the division will construct a telephone line to the battalion headquarters, if it is within a reasonable distance. Under similar circumstances, the battalion itself might construct a telephone line to a particularly important outpost or observation post, or to other critical points, for its own protection. Full use of short wire circuits is made where physical security would be questionable if radio were used.

403. VISUAL COMMUNICATION DURING EXPLOITATION, RECONNAISSANCE BATTALION. Visual signals are used for column control, and vehicular panels are displayed for identification to friendly aircraft. Because of its organization, the reconnaissance battalion is capable of being employed over a wide area. Emergency visual signals—pyrotechnics or smoke—often are used between elements for identification and for transmission of prearranged messages.

Section VIII. PREPARATION FOR THE DEFENSE, AND COMMUNICATION DURING THE DEFENSE, RECONNAISSANCE BATTALION

404. PLANNING FOR COMMUNICATION. All available means of communication are used in the defense. The tactical employment of the reconnaissance battalion in the defense will determine the relative use of wire and radio communication.

The communication system employed in a mobile defense will be similar to that employed in the attack. However, the wire system may be expanded to include the company headquarters, outposts, and observation posts. Details pertaining to communication are coordinated with higher, adjacent, and subordinate units. If the battalion is employed in a sustained defense, it will require use of a greater amount of wire than is authorized the unit. Planning should include the actions necessary to obtain the additional equipment required for this type of operation. Alternate means of communication always are provided.

405. COMMUNICATION DURING THE DEFENSE. The communication system used within the reconnaissance battalion is designed to support the tactical plan. In a mobile defense, the communication system employed is similar to that employed during the attack. In a sustained defense, the communication system is expanded to include additional wire and messenger service. Elements not actively engaged with the enemy normally maintain listening silence. The wire system must provide adequate communication facilities between all elements. During this type of operation, lateral communication between adjacent front-line units is essential. The wire communication system is expanded continually and improved as long as the battalion occupies a defensive position. When the battalion is deployed over extended distances, as when performing a covering mission for the division, radio communication normally will be utilized. Because

of the distances between units, care must be taken to site radios in locations which will insure maximum transmission range.

406. RECONNAISSANCE BATTALION COMMAND POST DURING DEFENSE. In selecting the command post, consideration must be given to concealment, cover, and protective shelter for the communication personnel and equipment. Alternate wire lines are constructed, and nonessential vehicles are sent to the rear. In defensive actions, the command post should be located so that minor enemy penetrations will neither disrupt communication nor necessitate undue movement. Alternate command post locations are selected and prepared for occupation.

407. RADIO COMMUNICATION DURING DEFENSE, RECONNAISSANCE BATTALION. a. Radio communication is replaced rapidly by wire and messenger communication in a sustained defense. As wire communication becomes available, a minimum amount of radio communication is maintained, principally for stand-by operations. Elements actively engaged with the enemy, and mounted patrols, still may require the use of radio. The battalion will operate in higher headquarters nets as directed. If wire communication is available to higher headquarters, the combat command administrative net normally will be closed and operation will be required on only the combat command command net. In this case, the combat command command net will act as a warning net and will be silenced to all but emergency transmissions.

Within the battalion, the battalion command net is used as a warning net. The radiotelegraph-telephone net may not operate unless contact is lost on the voice net. The battalion command net may include each company and installation as well as observation posts and outposts. If wire communication is available, the battalion command net is used only for emergency transmissions.

b. During the defense, radio security is of paramount importance because the enemy may have sufficient time to act on any information he may receive from opponent's transmissions. The best radio security is radio silence. Because this often is not practicable within the armored division, all precautions must be taken to insure correct procedure, minimum transmissions, and use of encrypted messages.

c. If the reconnaissance battalion is given a covering mission which requires dispersion of troops over a wide front, radio communication will be used almost to the exclusion of wire communication. Wire communication in most cases is impracticable because of the distances involved. In selecting and occupying positions, consideration must be given to the careful selection of desirable sites for radio sets, especially the shorter range radiotelephone sets. These sites are selected to insure maximum transmission range. Inasmuch as elements of the reconnaissance battalion may be out of radiotelephone range, consideration should be given to the possible assignment of medium-power radiotelegraph-telephone sets to those

separated units. These radio sets, if procured, undoubtedly will be diverted from their primary function. Possible sources of procurement are the division signal company and the reconnaissance battalion headquarters.

408. WIRE COMMUNICATION DURING DEFENSE, RECONNAISSANCE BATTALION. A strong defensive position requires a reliable and secure communication system. Therefore, messenger and wire communication is exploited to the utmost. Initially, a wire system is installed to provide communication between the battalion headquarters and each reconnaissance company. It is extended to include communication to platoons, observation posts, and outposts. Sufficient wire equipment is not available within the reconnaissance battalion to construct a complete defensive wire system; therefore, if such a system is to be constructed, additional equipment must be provided by higher headquarters.

CHAPTER 8

ARMORED DIVISION ARTILLERY

Section I. GENERAL

409. GENERAL. The mission of the armored division artillery is to provide artillery support for the elements of the armored division. Rapid, reliable, and flexible communication systems are vital in accomplishing this mission.

410. DIVISION ARTILLERY SIGNAL ORDERS—GENERAL. The signal operation instructions and standing signal instructions are distributed by the division signal officer. For further information on signal orders, see paragraphs 29–31.

Section II. ORGANIZATION, ARMORED DIVISION ARTILLERY

411. GENERAL. The division artillery, armored division (fig. 69), consists of the headquarters and headquarters battery; one field artillery battalion, 155-mm howitzer, self-propelled, armored; three field artillery battalions, 105-mm howitzer self-propelled, armored; and one antiaircraft artillery, automatic weapons battalion, self-

propelled. Each field artillery battalion consists of a headquarters and headquarters battery, three howitzer batteries, and a service battery. The anti-aircraft artillery automatic weapons battalion consists of a headquarters and headquarters battery and four automatic weapons batteries.

412. DIVISION ARTILLERY COMMUNICATION FACILITIES. a. Each battery in the armored division artillery contains communication personnel and equipment to install, operate, and maintain the communication facilities necessary for the employment of this artillery.

b. All means of communication must be utilized. No one means is considered primary and relied upon exclusively. Radio, wire, and messengers are the principal means of communication. Other means of communication available are visual and sound.

413. DIVISION ARTILLERY COMMUNICATION EQUIPMENT. There is sufficient communication equipment available to enable the division artillery units to establish and maintain communication within and between all units and elements of the division artillery, as well as with reinforced, supported, and supporting units. For further information, see appropriate tables of organization and equipment.

414. DIVISION ARTILLERY RADIO EQUIPMENT. The radio equipment consists of radio sets and associated equipment, together with the equipment

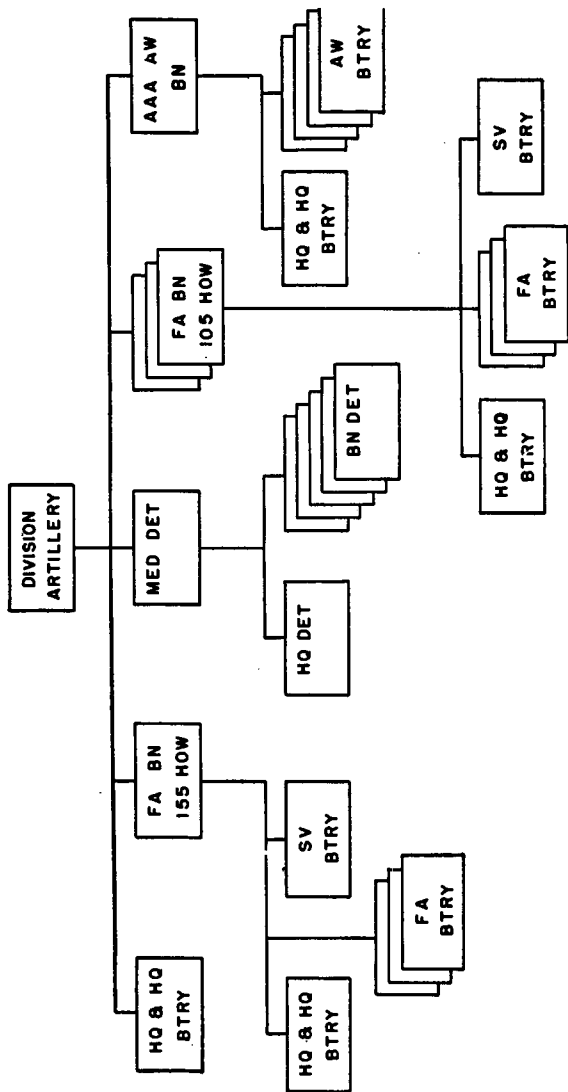


Figure 69. Organizational chart, armored division artillery.

necessary for organizational maintenance and repair. The radio sets used include medium-power radiotelegraph-telephone and medium- and low-power radiotelephone sets. The medium-power radiotelegraph-telephone sets generally are used for command, intelligence, and administrative purposes within the battalions, between battalions and division artillery headquarters, and between division artillery headquarters and higher headquarters. The medium- and low-power radiotelephone sets are used for voice radio communication between and within all units of the battalion and with higher, supporting, supported, and adjacent units. A low-power radio of the "handie-talkie" type is used by forward observers for direct contact with supported troops.

415. DIVISION ARTILLERY WIRE EQUIPMENT. The wire equipment consists of switchboards, telephones, field wire, and wire-laying equipment, together with certain items for wire maintenance and construction.

416. DIVISION ARTILLERY VISUAL EQUIPMENT. The visual communication equipment consists of flags, pyrotechnics, and panels. Panel sets designed for signaling are issued to the battalion headquarters batteries for emergency ground-to-air communication. Pyrotechnics include signal flares and colored smokes. Arm and hand signals are used for column control and signaling within units.

417. DIVISION ARTILLERY COMMUNICATION PERSONNEL. The communication officer is a staff

officer. He advises the commander on communication requirements. He is charged with the planning, operation, and maintenance of the communication system of his headquarters and subordinate units. For detailed information on the duties of other communication personnel, see paragraph 6-13.

418. FIRE-DIRECTION CENTER—GENERAL. The fire-direction center consists of the necessary personnel, equipment, and communication facilities to assist the commander in the execution of his orders and in directing the fires of battalions or howitzer batteries. Commanders must be able to maneuver and mass the fires of their organizations. To obtain this massing and maneuverability, the fire-direction center must have adequate and reliable communication at all times.

419. FORWARD OBSERVERS — GENERAL. a. There are nine forward observers in each 105-mm field artillery battalion; three of these are assigned to each howitzer battery. There are two forward observers in the 155-mm field artillery battalion; they are assigned to battalion headquarters.

b. Forward observers provide observation for close-support fires; they operate with companies of the supported unit. If operating with a tank company, the observer is mounted in a tank furnished by the tank company. If operating with armored infantry, the observer uses a $\frac{1}{4}$ -ton truck or moves on foot. The primary mission of forward

observers is to observe the movements of the supported unit and to adjust artillery fire on any hostile elements which interfere with the mission of that unit.

c. Communication normally will be by radio, although wire is installed whenever practicable. It is essential that forward observers have communication with both the supported unit and their battalion. Forward observers' radio equipment must be preset for operation on the battalion fire-direction channel as well as one of the three additional fire-direction channels (A, B, C). Wire communication will be extended to forward observers when the situation and time permit.

420. DIVISION ARTILLERY ORGANIC LIGHT AVIATION. a. Division artillery headquarters battery and each field artillery battalion contain light aviation sections. The senior pilot assigned to division artillery headquarters is the artillery light aviation officer on the staff of the division artillery commander.

b. The unit communication officer supervises the communication installations of the light aviation section. Each liaison plane is equipped with a radio set for communication with the unit's fire-direction center. Normally, the radio is preset for operation on the fire-direction channel of the division artillery and the fire-direction channel of the battalion.

421. DIVISION ARTILLERY RADAR. a. **General.** Each 105-mm field artillery battalion of the armored

division artillery contains a countermortar section. This section is equipped with a radar set and the necessary personnel and equipment for locating hostile mortars and other targets.

b. Communication. The countermortar section is equipped to operate radio, wire, and messenger communication.

Section III. ORGANIZATION FOR COMBAT, ARMORED DIVISION ARTILLERY

422. GENERAL. **a.** Armored artillery is a supporting arm. To be effective, artillery fire support must be coordinated with the action of the supported unit. Efficiency of artillery support depends upon adequate control, liaison with supported units, and dependable communication and observation. Proper organization for combat directly affects the efficiency of artillery support.

b. The 105-mm field artillery battalion normally is given the mission of direct support of a combat command. The 155-mm battalion is placed in general support of the division. The 155-mm battalion may be given a general-support reinforcing mission. When a combat command is operating independently, its supporting artillery may be attached.

423. DIVISION ARTILLERY LIAISON—GENERAL. **a.** Liaison between the field artillery and supported units is maintained at all times. This is accomplished by keeping liaison officers with the supported unit and its battalions and by command

liaison between the commanders concerned. Liaison officers represent their battalion commanders and advise the commanders of the supported units on field artillery matters. Prior to the attack, the liaison officer will—

- (1) Obtain information on the situation.
- (2) Obtain necessary maps, overlays, etc.
- (3) Consult with communication officers on signal matters.
- (4) Verify serviceability of signal equipment.
- (5) Consult with the battalion S-3 on operations matters

b. Liaison officers in the 105-mm field artillery battalions are equipped with radio sets to permit operation on a command channel of the supported unit as well as on a fire-direction channel of their own field artillery battalion. In certain situations, it may be necessary for the liaison officers to use medium-power radiotelegraph-telephone sets (obtained from the howitzer battery) to insure continuous communication to the artillery battalion.

c. When directed, a reinforcing artillery battalion will maintain a liaison officer with the reinforced artillery unit and, if so ordered, with higher headquarters. This officer is equipped to operate in the command net of the reinforced unit as well as in the fire-direction net of his own battalion.

424. DIVISION ARTILLERY COMMUNICATION WITH ATTACHED OR REINFORCING ARTILLERY. a. Wire.

When a field artillery battalion is attached to a

battalion of the armored division artillery, the unit to which attached is responsible for establishing wire communication with the attached unit. When field artillery reinforces armored field artillery, the reinforcing unit is responsible for establishing communication with the reinforced unit when practicable.

b. Radio. When radios of attached or reinforcing units cannot operate with the radios of the organic units, radio equipment and suitable operating personnel must be exchanged between the fire-direction centers of the attached or reinforcing units and the organic unit. Type radio nets used in such situations are shown in Figure 70.

Section IV. FIRE-DIRECTION COMMUNICATION, ARMORED DIVISION ARTILLERY

425. GENERAL. To permit flexibility of operation, fire missions may be handled by the division, battalion, or battery fire-direction center. Each howitzer battery is capable of handling a separate mission or of acting independently if necessary. The battalion also is organized so that it can function independently from division artillery headquarters.

426. DIVISION ARTILLERY HEADQUARTERS RADIO NETS. Three voice nets are employed by headquarters, division artillery. These nets include one for fire direction, one for communication between counter mortar sections, and one for division artil-

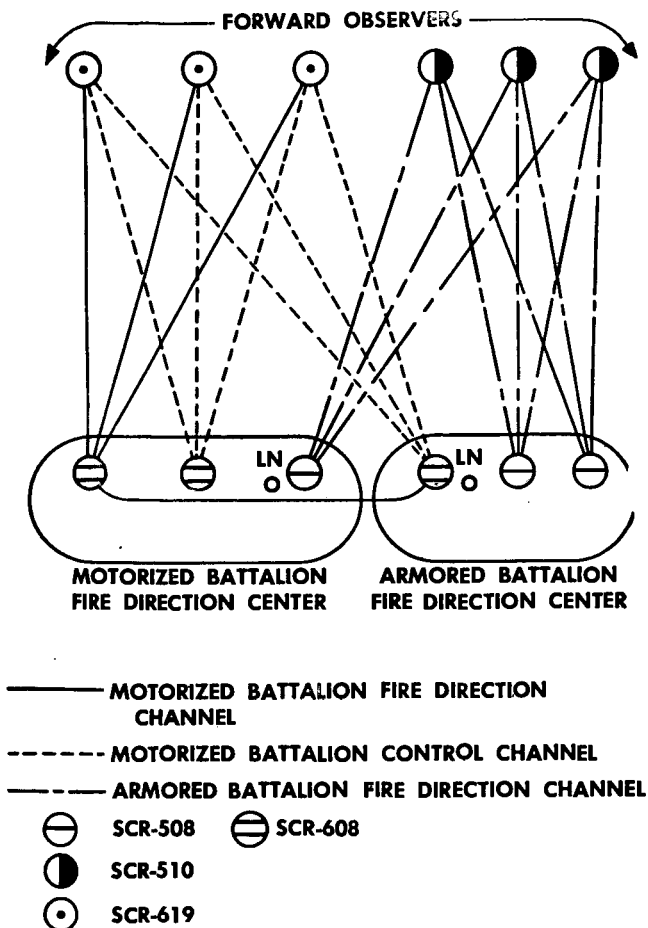


Figure 70. Typical radio nets that may be employed when a motorized field artillery battalion reinforces an armored field artillery battalion.

AAA BN 105-MM BN 105-MM BN 105-MM BN 155-MM BN

COM SEC S-3 S-3 S-3 S-3 S-2 S-2 S-2 S-2

DIVISION ARTILLERY FIRE DIRECTION NET

DIVISION ARTILLERY COMMAND NET (CW)

DIV RCN NET DIV COMD NET

COUNTER MORT ASST S-2 CO, EX O

DIV ARMY RADAR NET

AS REQUIRED

RAD SEC

CORPS ARTY FD NET

DIV ARMY COMD NET (CW) DIV ARMY COMD NET (CW)

AS REQUIRED

IN O IN O IN O IN O

AS REQD

EX O BTRY HQ AAA BN

COM O 105 BN 155 BN

DIV ADM NET

SURV SEC HQ BTRY CO COM O

SCR-508

SCR-510

SCR-506

SCR-593

SCR-536

DIV ARMY FD NET

DIV ARMY COMD NET (CW)

DIV ARMY COMD NET (VOICE)

292

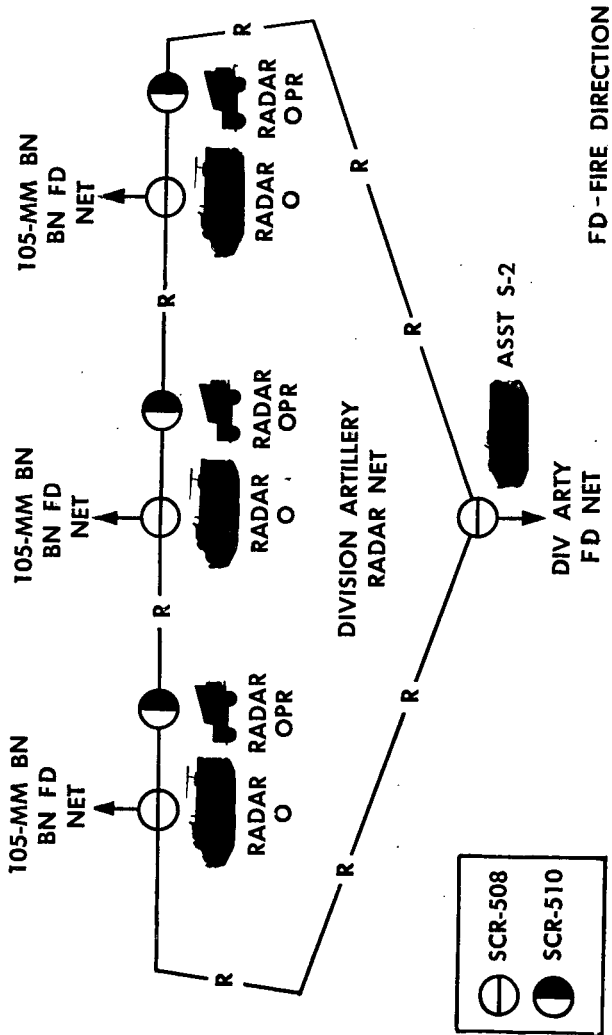


Figure 72. Typical radio net, division artillery radar net.

427. ARMORED FIELD ARTILLERY BATTALION (105-MM) RADIO NETS. Five voice radio nets are used by the 105-mm artillery battalion. These include one battalion fire-direction net, three alternate fire-direction nets, and one command net. One net, using radiotelegraph-telephone sets, is established for command functions and exchanging intelligence information. Figures 73 and 74 show type radio nets of the 105-mm field artillery battalion. The fire-direction nets (A, B, and C) also are available for use by howitzer batteries operating on separate missions.

428. ARMORED FIELD ARTILLERY BATTALION (155-MM) RADIO NETS. Three voice radio nets are employed by the 155-mm field artillery battalion. These include one net for battalion fire direction, one net for command, and one alternate fire-direction and air-observation net. One net, using radiotelegraph-telephone sets, is provided for command functions and exchanging intelligence information. Figures 75 and 76 show type radio nets used by the 155-mm field artillery battalion.

429. ANTIAIRCRAFT ARTILLERY AUTOMATIC WEAPONS BATTALION RADIO NETS. Two nets are employed by the antiaircraft artillery automatic weapons battalion; one is for fire control and the other for command. In addition, one net, using radiotelegraph-telephone sets, is established for antiaircraft artillery intelligence service (AAA-IS). Figure 77 shows type radio nets used by the antiaircraft artillery automatic weapons battalion.

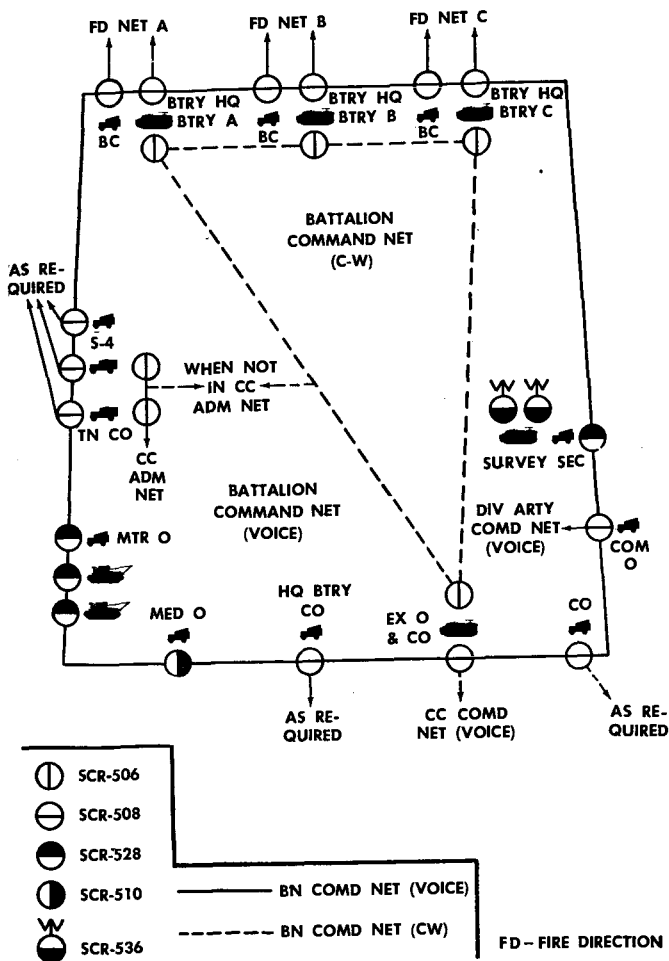


Figure 73. Typical radio nets, armored field artillery battalion (105-mm) command nets.

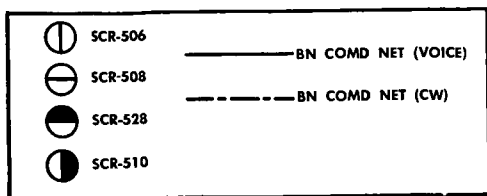
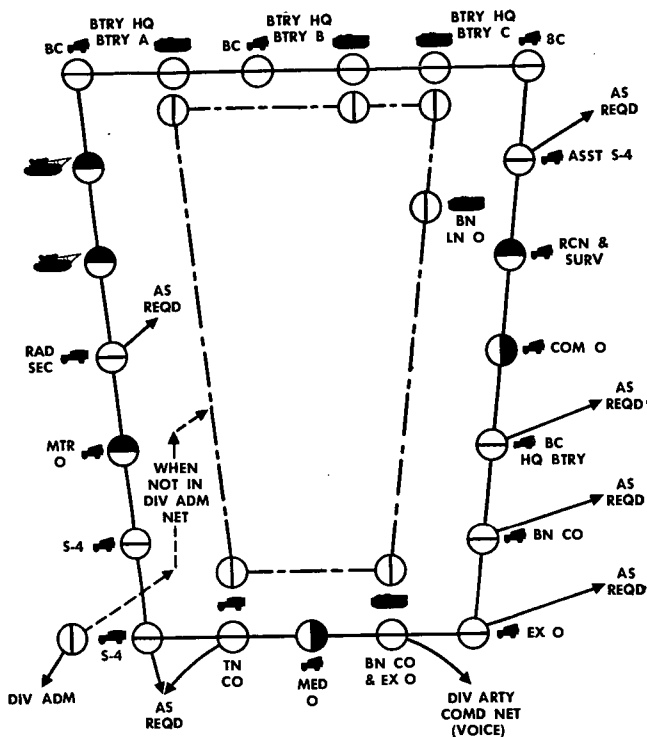


Figure 75. Typical radio nets, armored field artillery battalion (155-mm) command nets.

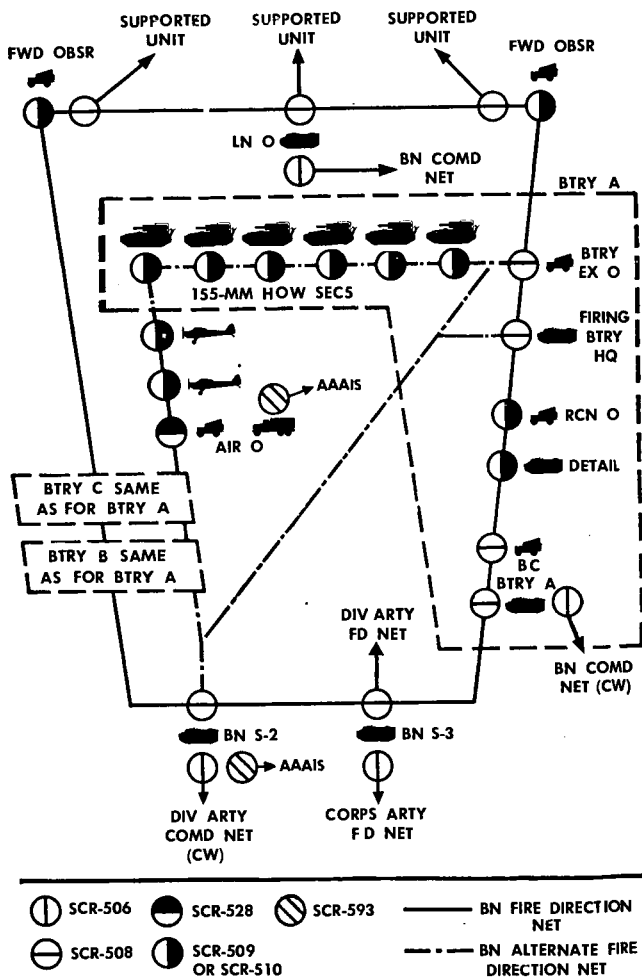


Figure 76. Typical radio nets, armored field artillery battalion (155-mm) fire-direction nets.

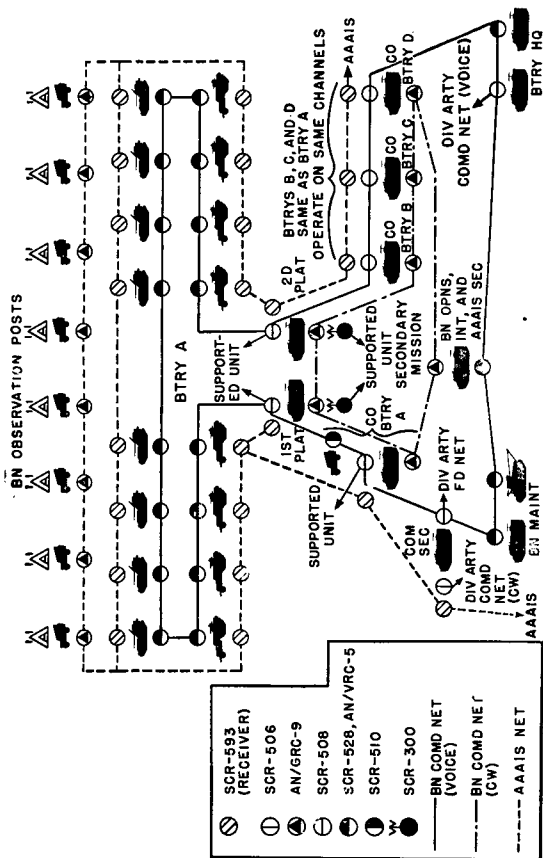


Figure 77. Typical command, fire control, and AAAIS radio net for an anti-aircraft artillery automatic weapons battalion (self-propelled).

430. DIVISION ARTILLERY WIRE COMMUNICATION—

GENERAL. Wire circuits are installed by division artillery headquarters and subordinate units to parallel existing radio nets. The wire system will be established if the time and situation permit.

431. DIVISION ARTILLERY WIRE SYSTEM. Type wire installations of division artillery are shown in figure 78. Division artillery personnel make local installations at the division artillery command post and install the circuits to organic and attached battalions. Division signal personnel install circuits from division headquarters to division artillery headquarters. The installations shown fulfill requirements.

432. ARMORED FIELD ARTILLERY BATTALION WIRE SYSTEMS. a. Wire capabilities of armored field artillery battalions are indicated in figures 79 and 80. These wire systems normally are installed when the time and situation permit. Variations and additions are covered by appropriate orders.

b. Essential wire lines include local installations, circuits to liaison officers and radar installations, and direct circuits from each field artillery battalion fire-direction center to howitzer battery executives.

c. Wire personnel of the howitzer battery install the direct circuit from the battalion fire-direction center to the battery executive immediately on occupation of position. Although the howitzer battery personnel install the intercommunication system from the executive's position to the

gun sections, howitzer batteries also may install trunk circuits between battalion and battery switchboards when necessary.

d. Battalion wire personnel install local circuits, circuits to liaison officers, circuits to the radar installations, and circuits to the supported unit.

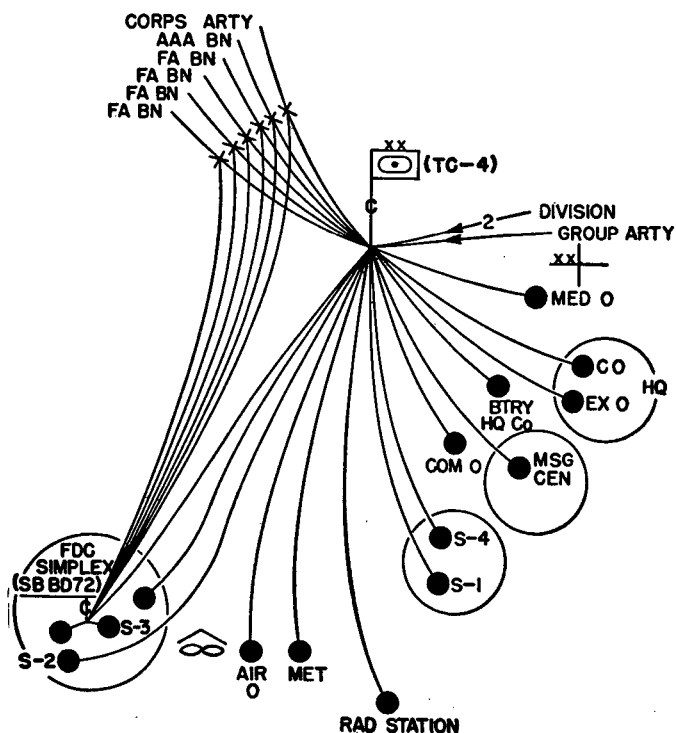


Figure 78. Command post wire communication, armored division artillery.

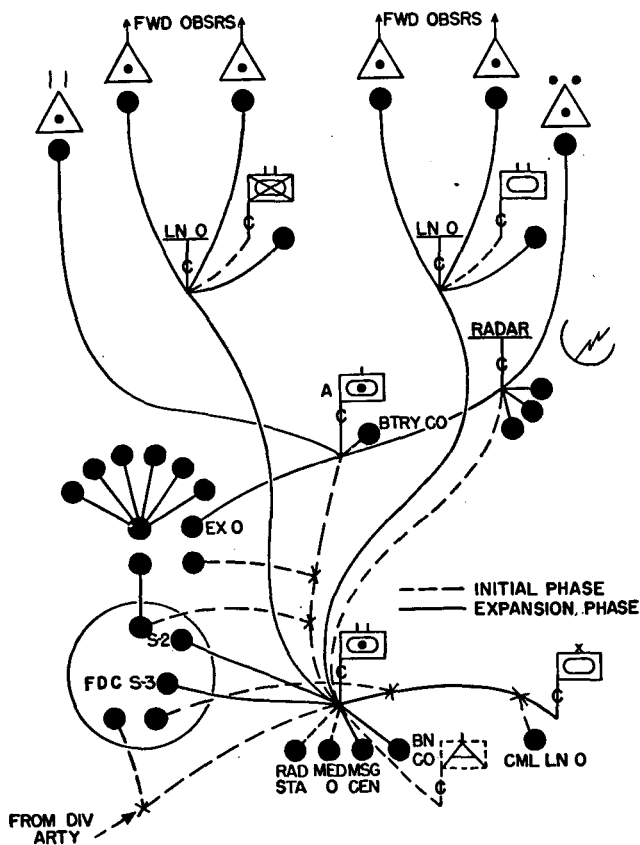


Figure 79. Wire systems, direct-support armored field artillery battalion (105-mm).

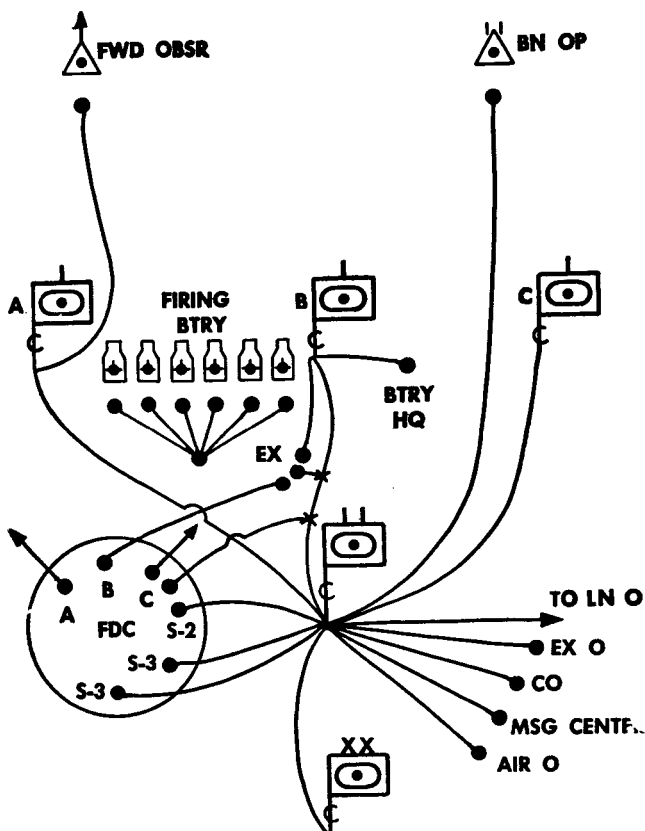


Figure 80. Typical wire system, armored field artillery battalion (155-mm).

433. ANTI-AIRCRAFT ARTILLERY AUTOMATIC WEAPONS BATTALION WIRE SYSTEM. A typical wire installation for the anti-aircraft artillery automatic weapons battalion is shown in figure 81.

Section V. COMMUNICATION DURING MARCHES AND IN BIVOUAC, ARMORED DIVISION ARTILLERY

434. RADIO COMMUNICATION DURING MARCHES. Unless radio or listening silence is imposed, each battalion will operate on one or more of its assigned battalion channels, as needed. In addition, each battalion commander will operate in the command net of the major serial with which his battalion is operating.

435. MESSENGER COMMUNICATION DURING MARCHES, DIVISION ARTILLERY. Because radio communication may be denied at any time, full use must be planned for available messengers. A planned use of scheduled messengers will facilitate the handling of routine tactical and administrative messages, and will reduce the number of special messengers.

436. VISUAL COMMUNICATION DURING MARCHES, DIVISION ARTILLERY. Pyrotechnics and other methods of visual communication provide an important alternate or supplementary means of communication during the march. All personnel should be familiar with the methods of visual signaling to be employed.

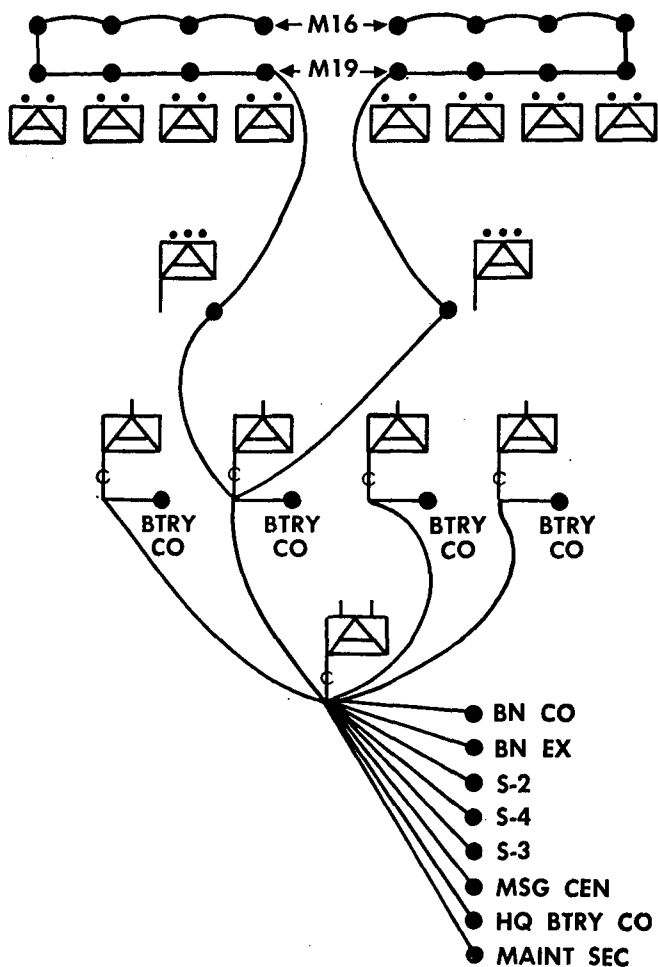


Figure 81. Typical wire system, antiaircraft artillery automatic weapons battalion (self-propelled).

437. RADIO COMMUNICATION IN BIVOUAC, DIVISION ARTILLERY. Radio operation generally will be restricted except for certain warning nets. All radio sets will be tested and tuned on their prescribed channels. If radio or listening silence is not imposed, only command nets normally are operated.

438. MESSENGER COMMUNICATION IN BIVOUAC, DIVISION ARTILLERY. Message centers are established and maintained by each headquarters down to and including battalions. Messengers are stationed at each message center, and scheduled messenger service may be provided if the volume of traffic so warrants.

439. WIRE COMMUNICATION IN BIVOUAC, DIVISION ARTILLERY. Wire installations will be kept to a minimum within the bivouac area. Circuits installed generally include only those necessary to link together the unit commanders at the various echelons.

Section VI. PREPARATION FOR THE ATTACK, ARMORED DIVISION ARTILLERY

440. PLANNING FOR COMMUNICATION. The communication officer must join the commander and staff in planning for operations. The communication officer must keep informed of current operations. He establishes a communication system to provide adequate communication within the unit and from the unit command post to supported

units during the attack. He insures that current signal orders, together with any required special prearranged signals or codes, are disseminated. He maintains close liaison with the communication officers of higher and supported units and coordinates all communication plans and activities with the commander and with staff members concerned.

441. FORWARD OBSERVERS IN PREPARATION FOR THE ATTACK. a. Before an attack, the forward observer will obtain the following information:

- (1) The situation.
- (2) Location of supported units.
- (3) Location of base point, check points, and prearranged or scheduled fires.
- (4) Prearranged and special codes.
- (5) Communication channels to be employed.

b. The forward observer will ascertain that his signal equipment is operative and report to the liaison officer for instructions.

442. RADIO COMMUNICATION DURING PREPARATION FOR THE ATTACK, DIVISION ARTILLERY. Communication is developed to permit the accomplishment of the mission. Radio nets will be expanded as directed by the unit commander. Initially, the field artillery battalion may be set up to operate on two voice channels: one for command and one for fire direction. As the communication load increases, the other radio nets become operative. All radio equipment must be tested and tuned for the forthcoming attack.

443. WIRE COMMUNICATION IN PREPARATION FOR THE ATTACK, DIVISION ARTILLERY. In preparation for an attack, wire circuits are installed and maintained as time and the situation will permit.

444. RADAR OFFICER IN PREPARATION FOR THE ATTACK. The radar officer of each battalion will reconnoiter for radar locations. He will coordinate his activities with those of the radar officer at division artillery headquarters. Zones of operation are assigned to each radar section of division artillery. Communication channels are prescribed for the operation.

445. DIVISION ARTILLERY SIGNAL SUPPLY AND MAINTENANCE IN PREPARATION FOR THE ATTACK.

a. Responsibility. Each commander is responsible for the functioning of all signal equipment in his organization. The communication officer will supervise the maintenance and repair of all signal equipment.

b. Signal supply. The communication officer, in conjunction with the unit supply officer, formulates and executes supply plans to insure replacement of needed items of signal equipment.

c. Signal maintenance. Organizational maintenance will be performed by the user and the unit repairman. Field maintenance is performed by the division signal company personnel, and depot maintenance is performed in fixed installations at Signal Corps base depots.

Section VII. COMMUNICATION DURING THE ATTACK, ARMORED DIVISION ARTILLERY

446. GENERAL. a. In offensive combat, field artillery positions are located well forward. In the attack, an armored field artillery battalion usually is closer to supported troops than is an infantry division artillery battalion, because of the—

- (1) Necessity for greater security from attack.
- (2) Rapidity with which a successful armored attack can get beyond the range of the artillery.
- (3) Required simplicity of the communication installations.

b. In a meeting engagement, artillery units not already in position must occupy positions promptly. Units already in position may have to be displaced forward to support the attack.

447. DIVISION ARTILLERY COMMAND POST DURING THE ATTACK. a. **General.** The extent of the communication system installed in the command post depends on the situation and the time available. In some situations, radio may be the principal means of communication. In the attack of an organized position, time normally is available to permit the establishment of more detailed command post installations.

b. **Organization.** A field artillery battalion command post might be organized as shown in figure 82. Basic installations shown can be expanded readily into a more elaborate system.

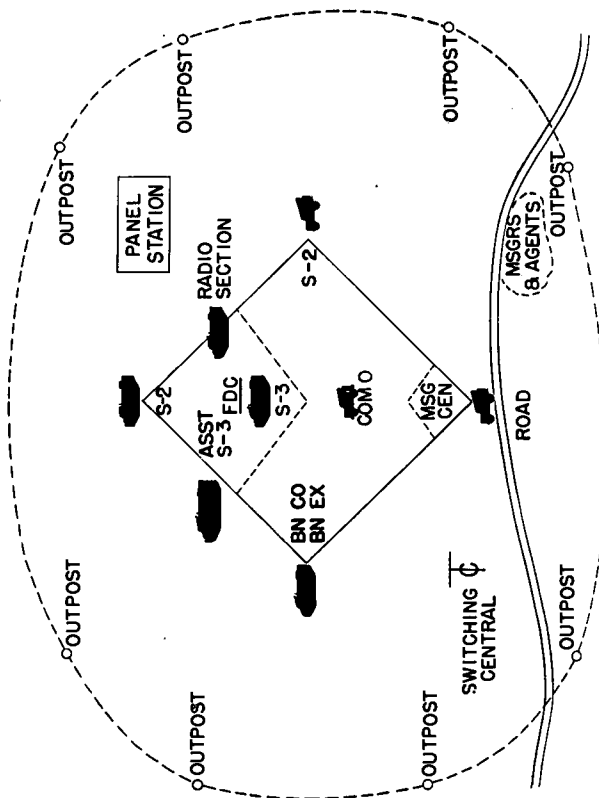


Figure 82. Typical field artillery battalion command post arrangement.

448. RADIO COMMUNICATION DURING THE ATTACK, DIVISION ARTILLERY. Radio is the principal means of communication during the attack. Communication plans made prior to the attack include the possibility that all means of communication other than radio may be temporarily impracticable. Radio channels are preset so that all field artillery forward observers within the battalion may be netted on a common frequency. When the attack begins, all radio sets are manned and ready for instant operation. Listening silence usually is lifted when enemy contact has been made. The fire-direction channel may be used to transmit fire commands to the howitzer battery while displacement is in progress. This system of transmitting fire commands will be used until wire communication between the battalion fire-direction center and the howitzer battery is established.

449. WIRE COMMUNICATION DURING THE ATTACK, DIVISION ARTILLERY. Wire circuits for an attack will be installed to supplement the radio system when time and the situation permit. Wire is not installed unless sufficient time is available to install and allow operation of the system.

Section VIII. COMMUNICATION DURING REORGANIZATION AND DURING EXPLOITATION, ARMORED DIVISION ARTILLERY

450. COMMUNICATION DURING EXPLOITATION. a. After an attack has reached its objective, the force commander may decide to continue the attack, to

withdraw, or to defend. In any event, forces are regrouped to fit the new scheme of maneuver. Communication systems must be reorganized and altered to fit new plans.

b. The reorganization phase is a critical one for artillery communication systems. Artillery support must be continuous to protect the supported units and assist in defense against counterattacks. Artillery communication officers must maintain existing communication systems and be prepared to extend or modify these systems. Radio nets continue in operation.

451. COMMUNICATION DURING EXPLOITATION.

During exploitation, armored artillery may be attached to a combat command operating independently. If the division is operating as a unit, the artillery may be retained under centralized control. The communication system employed by artillery during exploitation is basically the same as that used in an attack. Maintenance of communication requires maximum effort by all communication personnel if lines of communication are extended.

452. DIVISION ARTILLERY ORGANIC LIGHT AVIATION DURING EXPLOITATION. The field artillery battalion liaison planes should be under direct control of the field artillery battalion. Radio nets will remain unchanged. It is quite possible that air observers will furnish the bulk of fire missions during this period.

453. DIVISION ARTILLERY LIAISON AND FORWARD OBSERVERS DURING EXPLOITATION. Liaison officers and forward observers will continue to function as during the attack (pars. 419, 423, and 441).

454. DIVISION ARTILLERY COMMAND POST DURING EXPLOITATION. Rapid movement during exploitation will compel rapid and frequent displacements. Maintenance of contact between units, and between the forward and rear echelons of the headquarters, requires message center personnel, messengers, communication personnel, and appropriate signal equipment at each installation. Messengers with transportation are established as needed at message centers. Organic aircraft may be used for drop and pick-up message service.

455. RADIO COMMUNICATION DURING EXPLOITATION, DIVISION ARTILLERY. Radio is the principal method of communication used by armored field artillery units during exploitation. Division artillery will maintain contact with all artillery battalions at all times. Rapid and frequent displacements require continuous radio communication.

456. WIRE COMMUNICATION DURING EXPLOITATION, DIVISION ARTILLERY. During exploitation, the armored field artillery battalion will have little opportunity to employ wire communication, other than within the howitzer battery and between the howitzer battery and the battalion fire-direction center.

457. RADAR DURING EXPLOITATION, DIVISION ARTILLERY. Because of the excessive time consumed in reconnaissance, selection, and occupation of positions, radar may be of limited value during exploitation.

Section IX. PREPARATION FOR THE DEFENSE AND COMMUNICATION DURING THE DEFENSE, ARMORED DIVISION ARTILLERY

458. PLANNING FOR COMMUNICATION. Communication procedures during the defense generally are the same as procedures for the attack. The division artillery communication officer must obtain early information regarding the plan for defense. He must be prepared to recommend the use of existing wire circuits to increase the efficiency of communication during the defense. Upon receipt of the plan for defense, the communication officer plans the communication system to be used by the units of division artillery. Communication installations usually are more elaborate in a defensive situation than during a moving situation. The plans entail the following:

- a. Strict regulation of radio operation.
- b. The most effective use of existing wire circuits.
- c. Extension of wire circuits to parallel all radio nets in use in order to replace radio traffic with wire traffic as rapidly as possible.

459. COMMUNICATION DURING THE DEFENSE. a. In a mobile defense, the communication system

normally will be similar to that used during attack. Alternate and supplemental means of communication will be developed if the time and situation permit. Higher headquarters will dictate the employment of radio during a defensive situation.

b. In a sustained defense, sufficient time usually is available for installation of adequate wire communication nets as well as alternate and supplemental means.

460. WIRE COMMUNICATION DURING DEFENSE, DIVISION ARTILLERY. Wire communication should be provided for liaison officers and forward observers. To prevent interruption of communication with forward observers, duplicate wire circuits should be provided, if possible. Lateral circuits between field artillery battalions normally are established. Alternate circuits are laid along different routes. Permission to use commercial circuits or other circuits already in existence is obtained from the division signal officer. Where practicable, wire is laid to alternate positions to facilitate early action when these positions are occupied. Attention is given to maintenance and improvement of the wire circuits. Initially, wire is installed with great care; improvement of the wire net thereafter is continuous.

CHAPTER 9

ARMORED ENGINEER BATTALION

Section I. GENERAL

461. GENERAL. The mission of the armored engineer battalion is to facilitate the movement of the armored division, and to increase its combat effectiveness, by means of general engineer support. In providing engineer support to the division, the battalion—

a. Plans and supervises the operation of the battalion and attached engineer elements.

b. Conducts engineer reconnaissance.

c. Constructs, repairs, and maintains roads, fords, culverts, fixed or floating bridges, ferries, obstacles (including mine fields), landing strips, hasty command posts, crude shelters, and minor defensive installations.

d. Executes demolitions and removes obstacles, including clearing passages through mine fields.

e. Provides engineer personnel and equipment for hasty stream crossings, and assists in the reduction of enemy fortifications.

f. Provides engineer supply service, including map supply and water points.

g. Participates in missions other than engineer in case of emergency, when it has been determined definitely that such missions are more important than engineer work.

462. SIGNAL ORDERS, ARMORED ENGINEER BATTALION. For tactical and technical operation, coordination, and security, signal communication facilities are controlled through signal operation instructions (SOI), standing signal instructions (SSI), standing operating procedure (SOP), and signal annexes and orders. These instructions and orders are prepared by the division signal officer and published by division headquarters. Applicable portions of the division SSI and SOI are distributed for use within the battalion. Pertinent portions of the division SOP are incorporated in the battalion SOP.

Section II. ORGANIZATION, ARMORED ENGINEER BATTALION

463. GENERAL. The armored engineer battalion (T/O&E 5-215N) is the engineer component of the armored division. It consists of a headquarters, headquarters and service company; a bridge company; four lettered companies; and a medical detachment (fig. 83). Each lettered company (T/O&E 5-217N) consists of a company headquarters and three platoons, and each platoon consists of a platoon headquarters and three squads (fig. 84). The bridge company (T/O&E 5-218N) is composed of a company headquarters and two

platoons, each platoon consisting of a platoon headquarters, two fixed sections, and one float section (fig. 85).

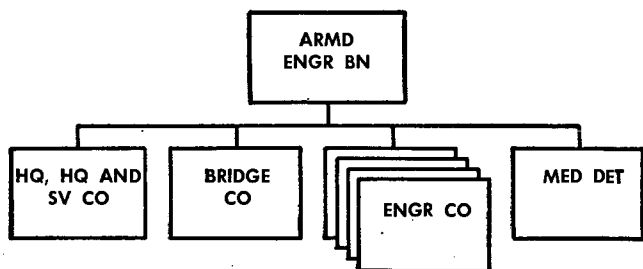


Figure 83. Organizational chart, armored engineer battalion.

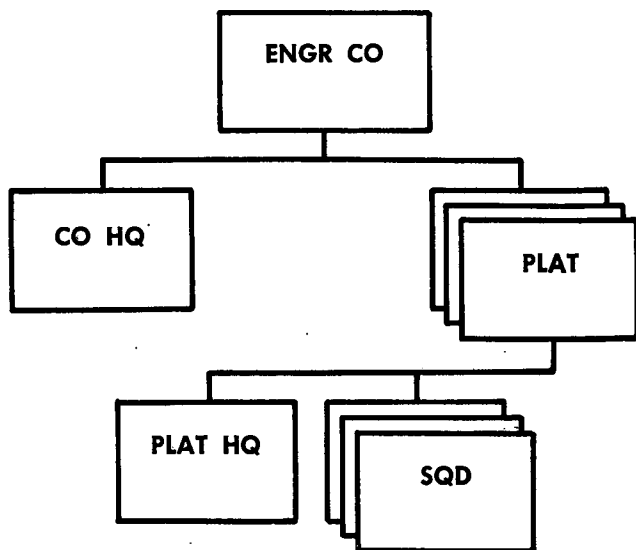


Figure 84. Organizational chart, armored engineer company.

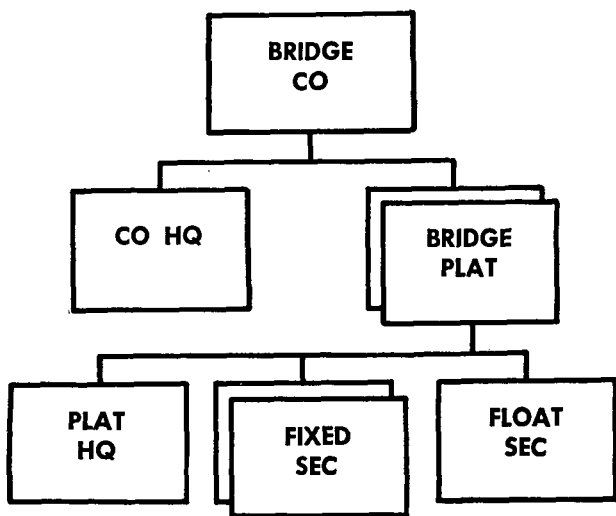


Figure 85. Organizational chart, bridge company, armored engineer battalion.

464. ARMORED ENGINEER BATTALION COMMUNICATION MEANS. Means of communication employed within the battalion are radio, messenger, wire, sound, and visual. To insure dependable and adequate communication facilities, the armored engineer battalion installs and maintains as many means of communication as possible. Normally, radio communication is the one used most extensively.

465. ARMORED ENGINEER BATTALION RADIO COMMUNICATION — GENERAL. The radio equipment consists of radio sets and associated equipment, together with the equipment necessary for organi-

zational maintenance and repair. Medium-power radiotelegraph-telephone sets provide communication between the battalion and higher headquarters and from the battalion to its companies. Medium- and low-power voice sets provide communication within the company. The armored engineer battalion is mobile; and all radios, except certain portable sets in the bridge company, are mounted in vehicles.

466. ARMORED ENGINEER BATTALION MESSENGER COMMUNICATION—GENERAL. a. Personnel detailed as mounted messengers are used to carry maps, documents, important tactical messages, and technical reports, and to act as liaison agents. Because of the mobility of the armored engineer battalion, dismounted messengers are used infrequently.

b. Message centers are established and operated at the battalion command post and at each company headquarters. The battalion communication officer is responsible to the commander for the efficient operation of the battalion message center. Each company commander is responsible for the operation of the company message center. The use of messages and message centers and the operation of command posts is the same for all units.

467. ARMORED ENGINEER BATTALION WIRE COMMUNICATION—GENERAL. When the situation permits, the armored engineer battalion uses wire for communication with division headquarters and with subordinate and supporting units. During fast-moving situations, wire communication

cannot be established. Wire usually is installed in bivouacs, in assembly areas, and in relatively stationary positions. Engineer units use wire communication for such tasks as controlling traffic through mine fields or defiles, maintaining contact with bridge construction parties, and coordinating working parties. Within the armored engineer battalion, the wire communication system is set up and maintained by personnel of the battalion communication section.

468. ARMORED ENGINEER BATTALION VISUAL COMMUNICATION—GENERAL. Visual communication supplements other means in the armored engineer battalion. Visual means may become very important in special situations and operations when other means are not adaptable or suitable or when other means fail or become inadequate. Engineers use visual means for communicating with patrols and work parties at rivercrossing sites, road blocks, and mine fields, and for transmitting panel messages to aircraft.

469. ARMORED ENGINEER BATTALION COMMUNICATION EQUIPMENT. There is sufficient equipment available to provide adequate communication within the battalion between the battalion and higher and adjacent units, and between elements of the battalion and supported units.

470. ARMORED ENGINEER BATTALION RADIO EQUIPMENT. The radio equipment consists of radio sets and those items necessary to perform organiza-

tional maintenance and repair. The radio sets include medium-power radiotelegraph-telephone sets, and medium- and low-power radiotelephone sets.

471. ARMORED ENGINEER BATTALION WIRE EQUIPMENT. The wire equipment consists of switchboards, telephones, and field wire, together with the necessary items for wire construction and maintenance. Sufficient wire equipment is provided to construct a wire system from battalion headquarters to companies and platoons when the battalion is not operating over extended distances.

472. ARMORED ENGINEER BATTALION VISUAL EQUIPMENT. The visual communication equipment consists of flags, panels, and pyrotechnics. Flag and panel sets are supplied to all armored and certain other vehicles in the engineer battalion. Devices for visual communication are—

a. Infrared signaling devices, used at night when operations demand radio silence and prohibit the use of flares and other visible means of communication.

b. Colored smoke grenades, used to transmit prearranged messages and to designate positions.

c. Pyrotechnics, used to transmit messages in a prearranged pyrotechnic code.

d. Colored and fluorescent panels, used for ground-to-air communication and for identification purposes.

e. Flashlights and flags, used to send Morse and semaphore code or other prearranged signals.

473. ARMORED ENGINEER BATTALION COMMUNICATION PERSONNEL. The current tables of organization prescribe the communication personnel for the armored engineer battalion. The duties of these personnel are described in paragraph 6-13.

474. ARMORED ENGINEER BATTALION SIGNAL SUPPLY AND MAINTENANCE. Requisitions for signal equipment are submitted through the battalion supply officer to the division signal supply officer. Maintenance and minor repairs are performed by communication personnel of the battalion under the supervision of the battalion communication officer. Major repairs are performed by the armored signal company.

Section III. ORGANIZATION FOR COMBAT, ARMORED ENGINEER BATTALION

475. GENERAL. For combat operations of the armored division, engineer troops are disposed in the manner that best will enable them to carry out their anticipated engineer tasks. The armored engineer battalion may move and function as a unit, or elements may be attached to or placed in support of other units of the division. Normally, one engineer company is attached to each of the combat commands. The remainder of the engineer battalion moves as a unit, performing general support missions, and is prepared to reinforce the companies with the combat commands as required. Common duties assigned to engineers for

types of combat operations are enumerated and discussed in FM 5-6.

476. ARMORED ENGINEER BATTALION COMMAND POST—GENERAL. The battalion command post is centrally located in the division zone, normally in the vicinity of the division command post. In this location, it can most effectively control subordinate units of the battalion, maintain liaison with division headquarters, and aid other divisional units. Company and platoon command posts are mobile, and are located near the command post of the supported unit or near the engineer battalion command post.

477. ARMORED ENGINEER BATTALION LIAISON—GENERAL. Liaison personnel are used between the armored engineer battalion and supported and supporting units. The engineer battalion may use officers or noncommissioned officers for liaison to other headquarters. Liaison personnel are representatives of the battalion commander.

478. ARMORED ENGINEER BATTALION RADIO COMMUNICATION—GENERAL. For combat operations, radio is the most important means of communication employed by the battalion. Medium-power radiotelegraph-telephone sets are used for communication from the battalion to higher and adjacent units, and between the battalion and companies. Medium- and low-power voice sets are used for communication within all elements of the battalion.

479. ARMORED ENGINEER BATTALION RADIO COMMUNICATION TO HIGHER HEADQUARTERS. The armored engineer battalion will operate secondary stations in two or more division radio nets. These nets principally use radiotelegraph, but may be switched to voice transmission when desired.

a. The *division command net* (fig. 18) is used for tactical control and command. It handles messages pertaining to tactical operations. The station of the division G-3 is the net control station (NCS). The radio station of the armored engineer battalion communication officer is a secondary station in this net.

b. The *division administrative net (forward)* (fig. 20) is used for the purpose of exchanging administrative messages pertaining to supply, evacuation, personnel, and like matters. It provides direct communication between the division G-4 and the S-4's units operating directly under division control.

c. The battalion may operate a secondary station in the *commanding general net*. See paragraph 123 for further information.

480. ARMORED ENGINEER BATTALION RADIO NETS. The exact radio nets to be used within the armored engineer battalion depend on the tactical make-up and employment of the units. The following typical radio nets are given as a guide to be used in planning. These nets normally are used within the battalion when there are no attachments or detachments.

481. ARMORED ENGINEER BATTALION COMMAND NETS. The *battalion command net (C-W)* (fig. 86) is used for the tactical command and control of the battalion. It is established between the battalion headquarters and each of the engineer companies and the bridge company. Frequently, engineer companies will be detached from the battalion. Detached companies report out of the radio nets of the engineer battalion, and report into radio nets of the unit to which attached. The radiotelegraph-telephone net is used for the transmission of cryptographed messages, for written messages that must be copied accurately, and when the voice set is out of range. The *battalion command net (voice)* (fig. 86) generally will parallel the radiotelegraph-telephone net. It is used for direct command, particularly when the situation permits the handling of messages in the clear. These nets provide communication between the battalion commander and staff and the company commanders. The assistant division engineer and the reconnaissance sections enter these nets when away from the command post. Staff officers enter the voice net as required.

482. ARMORED ENGINEER COMPANY COMMAND NET. The *company command nets* provide communication between the company commanders and elements of their units. Each company will operate on a separate channel. Typical nets are shown in figure 87. The company commander will operate his dual-receiver voice radio set both in the battalion command net and in his company net.

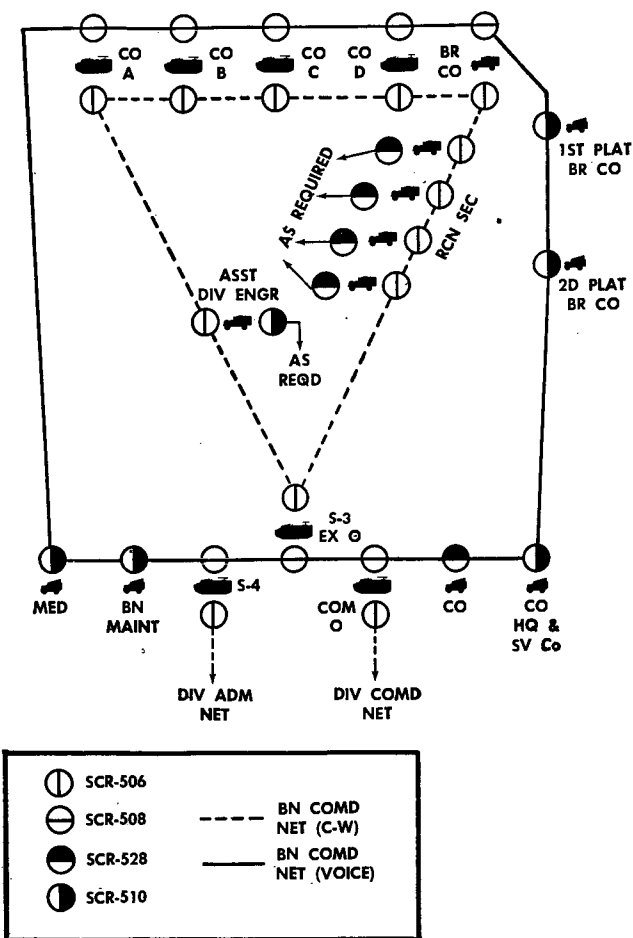


Figure 86. Typical radio nets, armored engineer battalion.

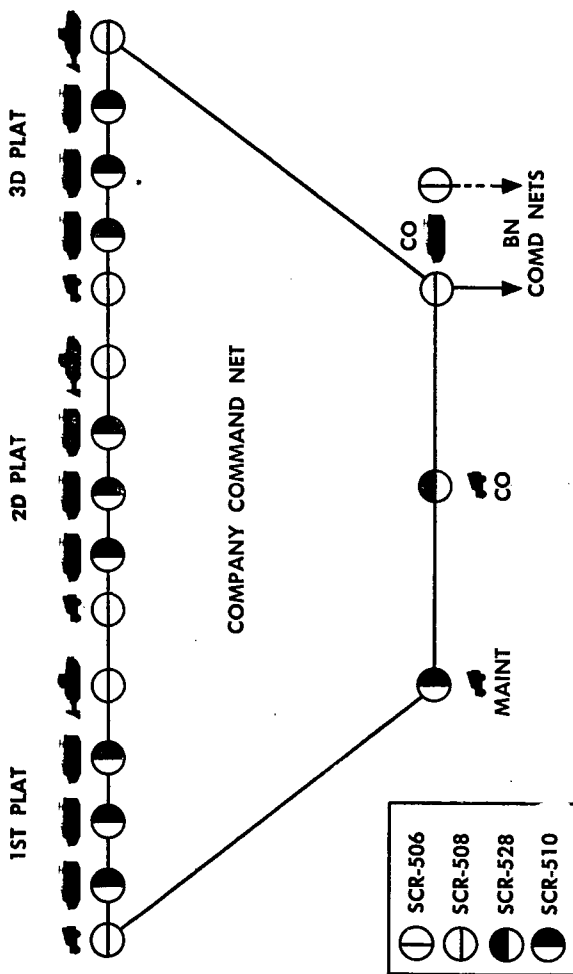


Figure 87. Typical radio nets, armored engineer company.

483. ARMORED ENGINEER COMPANY RADIO COMMUNICATION TO OTHER UNITS. An engineer company or comparable unit attached to a combat command or other unit will establish radio communication with that unit. Methods used to establish this communication will be covered in the division standing operating procedure. Additional information will be obtained from the unit to which attached. Normally, the company commander will enter the combat command command nets with the radio sets in his vehicle. He may maintain communication with the engineer battalion by keeping a voice radio set of the company headquarters on the battalion command net. If his company is operating at a distance beyond the operating range of the voice radio set, he may, at scheduled intervals, report out of the combat command command net (C-W) for a short period and enter the engineer battalion command net (C-W) to handle necessary messages. As a general rule, any element of the battalion attached to or supporting another unit will enter the command net of that unit. (See fig. 30.)

484. ARMORED ENGINEER BATTALION WIRE COMMUNICATION — GENERAL. During combat operations, wire communication may be used to fulfill certain needs. When the battalion is in bivouac or other relatively static situation, wire communication should be used to supplement radio and messenger communication. Since enemy intelligence means will include radio intercept and radio direction-finding, security requirements may

dictate that listening silence be imposed or that radio traffic be severely restricted. Under either of these circumstances, wire may become the principal means of communication for the battalion. When wire is used, particularly in forward areas, patrolling and proper tagging of lines are used to enhance signal security. When the distance between elements of the battalion makes the construction of a direct wire line impracticable, the engineer element may enter the division wire net through the switchboard of any divisional unit in the vicinity. Previously established wire facilities (commercial or military) are used where possible. The table of organization and equipment provides no personnel for installing and operating the battalion wire system; therefore, all communication personnel of each company and the battalion are trained in the installation, operation, and maintenance of the wire equipment provided.

485. ARMORED ENGINEER BATTALION WIRE SYSTEM.

Figure 88 shows a method of using the wire communication equipment to provide a wire system for the armored engineer battalion. The division signal company normally will install the wire line from division headquarters to the engineer battalion switchboard.

Section IV. COMMUNICATION DURING MARCHES AND IN BIVOUAC, ARMORED ENGINEER BATTALION

486. COMMUNICATION DURING MARCHES—GENERAL. During division marches, the engineer bat-

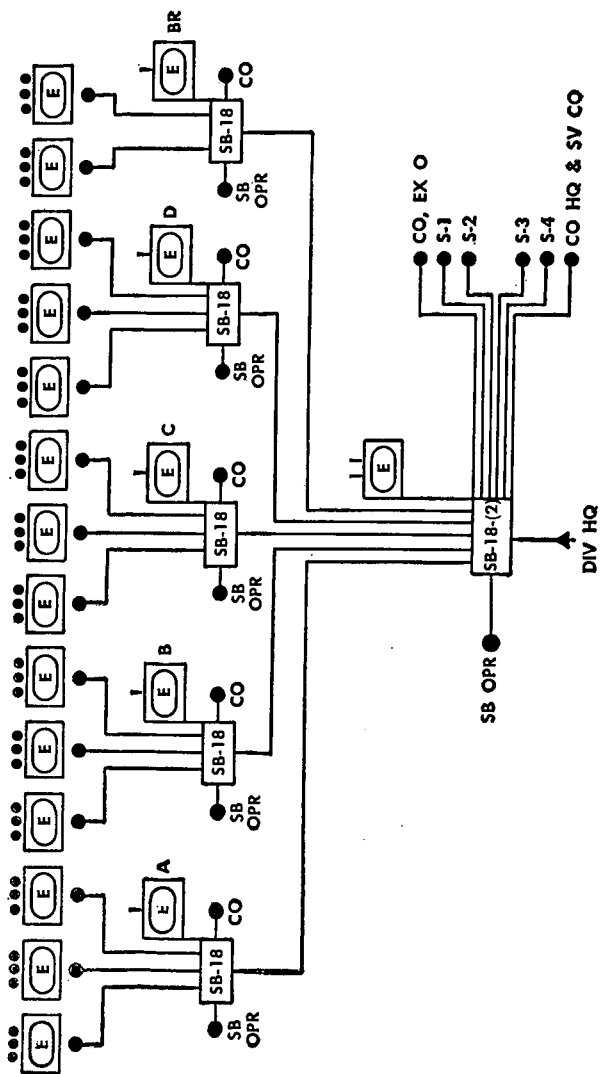


Figure 88. Typical wire system, armored engineer battalion.

talion may move as a unit, or certain of its elements may move with other divisional units. The tactical situation, advance reconnaissance reports, and anticipated engineer troop requirements govern the troop dispositions. Engineer duties are discussed in FM 5-6.

487. RADIO COMMUNICATION DURING MARCHES, ARMORED ENGINEER BATTALION. a. When moving as a unit, the engineer battalion maintains communication by radio with division headquarters and with subordinate units. Close contact with elements of the battalion enables the commander to furnish information and instructions to those elements and to redispense his troops, if necessary.

b. When an engineer element (normally a company) is attached to or supports a divisional unit, it is necessary that communication be maintained with that unit. The radio sets in the vehicle of the company commander enter the command net of the supported unit. (See fig. 30.) In addition, the company maintains contact with the engineer battalion by the use of a voice radio set in the engineer battalion command net. If distance becomes too great for voice communication, the radiotelegraph-telephone set may, at scheduled intervals, report out of the supported unit command net and into the engineer battalion command net to handle necessary traffic.

488. MESSENGER COMMUNICATION DURING MARCHES, ARMORED ENGINEER BATTALION. a. Messenger communication (or liaison personnel)

is used to augment the radio facilities of the engineer battalion. Because of the continuous need for information on engineer capabilities at division headquarters, and because communication is a major problem during tactical operations, an assistant division engineer is used as chief engineer liaison officer at the division command post. He is equipped with adequate radio communication facilities for continuous contact with the division engineer.

b. The armored signal company provides messenger service between division headquarters and the engineer battalion. Messenger vehicles should be marked plainly so that traffic priority can be given them. Planned messenger runs should be scheduled at frequent intervals to handle routine or administrative messages; this will reduce the number of special messengers required.

c. When an engineer element is attached to a unit, such as a combat command, it maintains a mounted messenger or liaison agent at the command post of that unit.

489. VISUAL COMMUNICATION DURING MARCHES, ARMORED ENGINEER BATTALION. Visual communication is used for identification purposes and for conveying prearranged code messages to air and ground elements in the vicinity.

490. ARMORED ENGINEER BATTALION COMMUNICATION IN BIVOUE—GENERAL. In bivouac, the battalion maintains radio, messenger, and probably wire communication with higher headquar-

ters and subordinate units. When an engineer element is attached to or supports a unit, the engineer element maintains radio contact with that unit and with the engineer battalion command post. Normally, the supported unit installs a telephone line from its switchboard to the engineer command post, enabling the engineer element to contact the supported unit or its battalion headquarters through the division wire system.

Section V. COMMUNICATION DURING THE ATTACK, ARMORED ENGINEER BATTALION

491. GENERAL. For the attack, an engineer company normally supports each of the leading combat commands. The remainder of the battalion performs general support missions and is prepared to reinforce leading engineer elements with troops, equipment, and supplies. Communication requirements for an attack over terrain that presents no formidable obstacles are similar to those discussed in paragraphs 487-489. Engineer duties during the attack are discussed in FM 5-6.

492. ARMORED ENGINEER BATTALION PLANNING FOR COMMUNICATION DURING THE ATTACK. In planning for the attack, the communication procedures and means that are to be used are worked out and included in the attack order or as an annex to the attack order. The axis of signal communication is designated to help communication personnel direct their work of fulfilling the communication requirements of the battalion.

Signal equipment is checked, and radio frequencies, call signs, and security regulations are made known to all interested personnel. If practicable, signal equipment and procedures are put through a rehearsal in an attempt to correct any deficiencies that may occur. Elements attached to or supporting another unit must coordinate all communication plans with that unit.

493. ARMORED ENGINEER BATTALION LIAISON DURING THE ATTACK. The attack order issued by the division normally will designate troop dispositions of division elements. A staff officer of the engineer battalion may be used as unit engineer at the headquarters of the unit for which key support missions are to be performed. This officer will be provided with a radio which he uses in the engineer battalion radio net or in the net of the unit being supported. The two liaison officers are used as required by the division engineer. These liaison officers are mounted in $\frac{1}{4}$ -ton trucks, but are not equipped with radios.

494. RADIO COMMUNICATION DURING THE ATTACK, ARMORED ENGINEER BATTALION. The radio net for the attack is shown in figures 86 and 87. Modification is made as required and as discussed in paragraphs 487-489. During the attack, the bulk of all radio messages will be sent in the clear, but messages are not transmitted indiscriminately in the clear. If the message is transmitted in the clear, it is worded so as to give as little information as possible to the enemy. Locations of friendly forces are encoded by use of map coordinate codes.

495. REQUIREMENTS FOR RADIO COMMUNICATION DURING THE ATTACK, ARMORED ENGINEER BATTALION. During the attack, radio communication must provide for—

a. Maintaining constant contact between the engineer battalion and its elements and supported units.

b. Controlling traffic at defiles, such as narrow bridges, cratered roads, and lanes through mine fields.

c. Keeping interested agencies informed about the progress of work parties.

d. Informing higher headquarters and supporting units as to what help in personnel, supplies, and equipment is needed.

e. Conveying tactical and technical intelligence information.

f. Conveying routine messages and reports.

496. WIRE COMMUNICATION DURING THE ATTACK, ARMORED ENGINEER BATTALION. Wire communication may be used before the attack, in the bivouac or assembly area, to complement radio means, as discussed in paragraph 490. During the attack, wire is used sparingly, being used only at locations of primary interest to engineers, such as defiles in need of traffic control, bridge construction sites, or major obstacles. If wire is to be installed, sufficient time should be allowed to construct the lines and permit their operation.

497. ARMORED ENGINEER BATTALION COMMAND POST DURING THE ATTACK. For the attack, com-

mand posts are established at designated points along the axis of signal communication and moved forward as rapidly as the situation permits. Their type (fixed or mobile), location, and functions are discussed in paragraph 476.

Section VI. COMMUNICATION DURING REORGANIZATION AND DURING EXPLOITATION, ARMORED ENGINEER BATTALION

498. COMMUNICATION DURING REORGANIZATION.

Reorganization is carried out after combat to replace casualties, reassign personnel if necessary, and replenish supplies and equipment. Communication within the battalion is of great importance but presents no significant problems, since the battalion elements are occupying relatively stable positions. Communication requirements are very similar to those described for bivouac in paragraph 490.

499. COMMUNICATION DURING EXPLOITATION.

Exploitation means taking full advantage of success in battle and following up initial gains. As the situation develops, it is desirable that any necessary redistribution of troops be made as smoothly and quickly as possible, in order to realize the greatest battle success. Radio is the principal means of communication during the exploitation. The tactical plans of the commander must be understood by communication personnel to enable them to maintain flexible communication. Prior planning must be so complete that any changes in

tactical organizations will not seriously affect communication for any length of time. The channels on the medium-power voice radio sets must be preset to net with units with which the elements of the engineer battalion might operate during this time. Firm and adequate means of communication are required.

500. ARMORED ENGINEER BATTALION LIAISON DURING EXPLOITATION. Liaison elements are disposed during exploitation to conform to the support missions of the battalion or battalion elements. Liaison considerations are similar to those covered in paragraphs 477 and 493.

501. RADIO COMMUNICATION DURING EXPLOITATION, ARMORED ENGINEER BATTALION. In the armored engineer battalion, radio is used to bring about the redistribution of engineer troops to support the exploitation. Instructions and orders from higher headquarters to battalion, and from battalion to subordinate elements, must be conveyed clearly and concisely, in minimum time. Proper radio net discipline, control, and operating procedures are necessary. Once momentum is gained in the exploitation operation, communication requirements become similar to those discussed for the attack in paragraph 495.

502. WIRE COMMUNICATION DURING EXPLOITATION, ARMORED ENGINEER BATTALION. During exploitation, wire communication seldom is used except for the locations noted in paragraph 496.

Section VII. COMMUNICATION DURING THE DEFENSE, ARMORED ENGINEER BATTALION

503. GENERAL. In the defense, engineer elements normally support division elements. Engineer missions include active support of front-line elements and general work throughout the division area.

504. ARMORED ENGINEER BATTALION PLANNING FOR COMMUNICATION DURING THE DEFENSE. Communication plans for the defense provide for contact between battalion elements and division headquarters, and between battalion elements and supported units. Radio, messenger, wire, and visual communication means are used. Communication nets shown in figures 86-88 are applicable.

505. ARMORED ENGINEER BATTALION COMMAND POST DURING THE DEFENSE. Command posts and message centers of engineers are established in the vicinity of the major engineer effort of each particular element. The command posts of the engineer battalion and the supporting engineer group usually are in contact by radio and wire. Alternate command post locations are selected and prepared for occupation, and alternate wire lines are constructed. Nonessential vehicles are sent to the rear.

506. RADIO COMMUNICATION DURING DEFENSE, ARMORED ENGINEER BATTALION. a. During defensive operations, engineer elements operate

radios in the command nets of the supported units, the engineer battalion command nets, and the division nets. Radio is replaced rapidly by wire and messenger communication in the defense. As wire communication becomes available, a minimum amount of radio communication is used, principally for stand-by operation. Within the battalion, the battalion command net is used as a warning net.

b. During the defense, radio security is of paramount importance. The enemy may have time to act on any intercepted traffic. Because radio silence normally is not practicable within the armored division, all precautions must be taken to insure correct procedure, minimum transmissions, and use of encrypted messages.

507. WIRE COMMUNICATION DURING DEFENSE, ARMORED ENGINEER BATTALION. Wire communication usually is established in the defense. The wire system may be set up as shown in figure 88 and augmented with connections to switchboards of other units within the division wire system.

CHAPTER 10

ARMORED DIVISION TRAINS

Section I. MISSION AND ORGANIZATION, ARMORED DIVISION TRAINS

508. MISSION. The armored division trains contain the necessary service elements and administrative headquarters to furnish supply, evacuation, maintenance, services, and personnel support for the division.

509. ORGANIZATION. The organization of the armored division trains is shown in figure 89.

510. HEADQUARTERS AND HEADQUARTERS COMPANY, ARMORED DIVISION TRAINS—GENERAL. This unit contains the personnel and equipment necessary for tactical command and control of the division trains and attached units, and for the administration and service support of the division headquarters rear echelon and division band.

511. ARMORED DIVISION BAND—GENERAL. This unit has the mission of furnishing appropriate music for military formations, concerts, entertainments, and social functions. The band may, on occasion, perform appropriate combat duties as

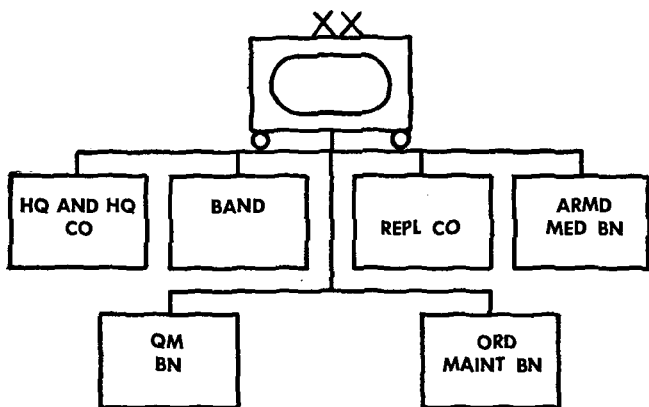


Figure 89. Organizational chart, armored division trains.

directed by the commander of the unit to which the band is assigned or attached. The band is attached to headquarters company, armored division trains, for administration and supply.

512. QUARTERMASTER BATTALION—GENERAL. This unit has the mission of procuring and distributing rations, fuel and lubricants, clothing, and other quartermaster supplies and equipment, and of furnishing limited bathing and laundry facilities, graves registration services, and transportation for the procurement of supplies for the division.

513. ORDNANCE MAINTENANCE BATTALION—GENERAL. This unit has the mission of procuring, storing, and issuing ordnance general supplies; making technical inspections of ordnance matériel; exercising administrative control of ammu-

nition supply; and furnishing ordnance field maintenance for all organic elements of the division.

514. ARMORED MEDICAL BATTALION—GENERAL.

This unit has the mission of furnishing division medical service, including evacuation of unit medical installations, operation of the division clearing station, and dental service and medical supply service for the division.

515. DIVISION REPLACEMENT COMPANY—GENERAL.

The replacement company provides for the reception, processing, administration, and training of replacements and casualties until they are sent forward to join their unit.

516. OTHER UNITS OF DIVISION TRAINS. In addition to the units listed above, the following units normally are considered a part of division trains and may move with it:

a. Division headquarters rear echelon. The rear echelon of division headquarters is responsible for the details of division administration. It normally is composed of the division adjutant general, inspector general, judge advocate general, finance officer, chaplain, special services officer, and other officers not required in the forward echelon, with their sections.

b. Division administrative center. The division administrative center contains the personnel sections of units within the division; it operates and moves with the division headquarters rear echelon.

c. Division signal company (rear). The armored signal company (rear) furnishes communication facilities for the rear echelon of division headquarters. It often may be a part of division trains and operate in the trains area.

517. DIVISION TRAINS COMMUNICATION MEANS.

Radio is the principal means of communication in the armored division trains. Radio is supplemented by wire and messenger. Telephone communication may be supplied to all units. In addition, the rear echelon of division headquarters normally will have teletype communication with the forward echelon. Sound and visual are auxiliary means; however, except for the use of vehicular panels and arm and hand signals, they are used only in an emergency. The employment of radio and wire communication is covered in paragraphs 527-544.

518. DIVISION TRAINS COMMAND POST—GENERAL.

The selection of command post sites will follow the principles set forth in paragraph 26. The division trains should be located on the road net so as to be most readily accessible to supply installations, the division command post, the division headquarters rear echelon, and supported troops.

519. DIVISION TRAINS MESSENGER SERVICE—GENERAL.

The use of scheduled messenger service assumes greater importance within the division trains because of the greater number of administrative matters that cannot be handled by electrical means. Messenger service should be so estab-

lished as to provide frequent runs to the division command post, the division supply control point, the division headquarters rear echelon, and the units organic to division trains. This messenger service normally is maintained by messengers from the armored signal company, operating from the division headquarters rear echelon message center.

Section II. ORGANIZATION FOR COMBAT, ARMORED DIVISION TRAINS

520. GENERAL. The major units charged with providing logistical and personnel support for the division are the ordnance maintenance battalion, armored medical battalion, quartermaster battalion, division headquarters rear echelon and division replacement company. These units support the division as outlined below.

521. QUARTERMASTER BATTALION ORGANIZATION FOR COMBAT. The quartermaster battalion will operate the division class I and class III mobile supply points. These mobile supply points often will operate forward of the division trains area, controlled by the division supply control point, in order to better support the combat elements of the division. This is particularly applicable in the exploitation. The quartermaster battalion, minus the elements necessary to operate the mobile supply points, normally will furnish quartermaster class II and IV supply, graves registration service,

and limited bathing and laundry facilities from the division trains area.

522. ORDNANCE MAINTENANCE BATTALION ORGANIZATION FOR COMBAT. In combat operations an ordnance maintenance company or detachment normally supports each committed combat command and may be attached to the combat command when the division operates over extended distances. The battalion minus these companies or detachments will support the remainder of the division from the division trains area. The division ammunition officer, utilizing trucks from the quartermaster battalion, will operate the division class V mobile supply point, normally in the vicinity of the division class I and III supply points.

523. ARMORED MEDICAL BATTALION ORGANIZATION FOR COMBAT. In combat operations, a medical company normally supports each committed combat command. The third or reserve medical company supports the reserve command and the division minus the two committed combat commands. When the division operates over extended distances, these companies or detachments from these companies may be attached to the combat commands and the reserve command and move with them. The headquarters and headquarters company of the armored medical battalion normally operates in the vicinity of the division trains area.

524. DIVISION HEADQUARTERS REAR ECHELON ORGANIZATION FOR COMBAT. The division head-

quarters rear echelon, with the attached division administrative center, furnishes administrative personnel support to the division from the division trains area. During combat operations, the division headquarters rear echelon often will not move with division trains but will remain behind until the tactical and logistical situation permits its movement forward.

525. DIVISION REPLACEMENT COMPANY ORGANIZATION FOR COMBAT. The replacement company normally moves with, and operates in the vicinity of, the division trains headquarters and headquarters company.

526. DIVISION SUPPLY CONTROL POINT (DSCP) ORGANIZATION FOR COMBAT. The division supply control point is a control activity and installation organized to regulate and expedite logistical support of the combat elements, particularly resupply during combat. The division supply control point normally will be located ahead of the trains, well forward on the division supply route, in the immediate vicinity of the division mobile class I, III, and V supply points. (See fig. 90.)

527. DIVISION TRAINS RADIO COMMUNICATION—GENERAL. The armored division trains make extensive use of radiotelegraph-telephone communication. It is used to provide communication between division headquarters and division trains, and between division trains and the battalions under its control. In addition, the ordnance maintenance and armored medical battalions employ

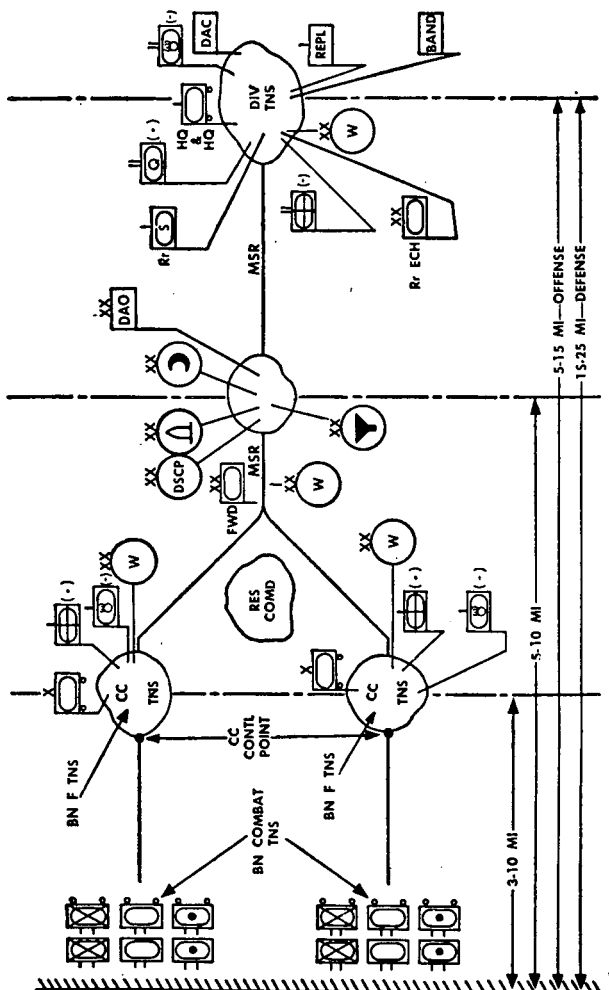


Figure 90. Logistical organization, armored division.

radiotelegraph communication between their battalion headquarters and companies. Voice radio sets are used for communication within the companies and for staff communication at higher echelons. Normally, in a slow-moving or static situation, the use of radio communication in these units will be restricted and will be replaced with wire and messenger communication.

528. DIVISION TRAINS RADIO NETS. Headquarters and headquarters company, armored division trains, operates a secondary station in the *division administrative net (rear)* (fig. 20). This radiotelegraph-telephone net provides radio communication between the division command post and the division trains. The trains headquarters will operate a net control station for the *trains command net* (fig. 91). This radiotelegraph-telephone net is used for the command and control of units of the trains. The voice radio sets of the headquarters and headquarters company are operated together on the *trains headquarters net* (fig. 91). This net provides voice radio communication between the various vehicles and sections of the headquarters and headquarters company.

529. ORDNANCE MAINTENANCE BATTALION RADIO COMMUNICATION—GENERAL. The wide deployment of units and the scope of activity of the battalion require the extensive use of radio communication. When the battalion is concentrated, and telephones can be used as the principal means of communication, it still will be necessary to maintain radio contact with the three salvage and recovery sec-

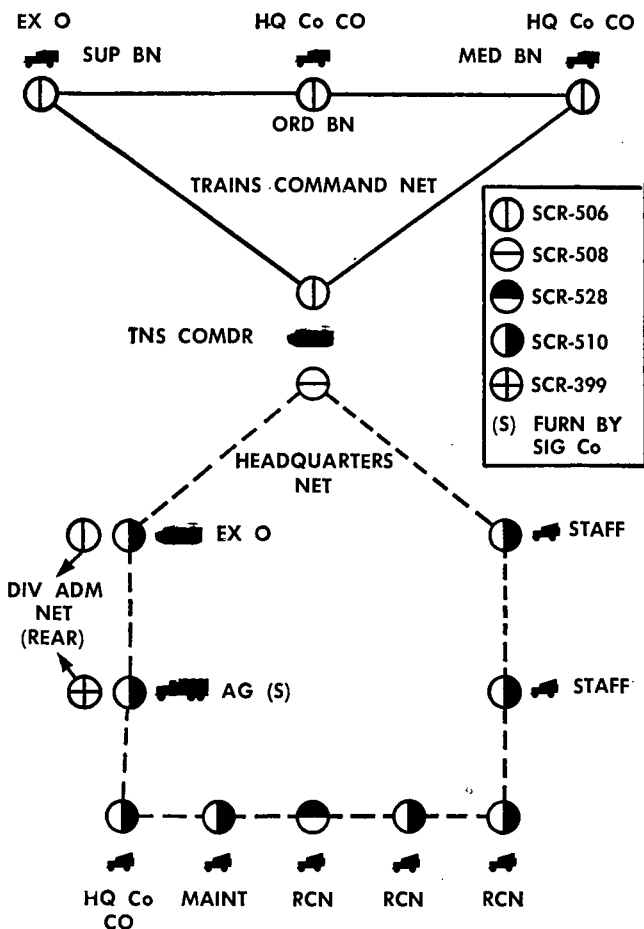


Figure 91. Typical radio nets, armored division trains.

tions when they operate away from the battalion area.

530. ORDNANCE MAINTENANCE BATTALION RADIO COMMUNICATION TO HIGHER HEADQUARTERS. The battalion operates secondary stations in two nets to higher headquarters. In the first of these nets, the battalion headquarters company operates a station in the *trains command net*. In the second, the battalion headquarters and the division ammunition officer both operate stations in the *division administrative net (rear)*. The battalion station in the division administrative net (rear) is maintained for the purpose of establishing direct radio contact with the division G-4. The division ammunition officer primarily requires communication with division headquarters, division artillery, and the combat commands. The division administrative net (rear) provides direct radio communication from the division ammunition office to the division G-4, who in turn has direct radio communication with the combat commands and the division artillery through the *division administrative net (forward)* (fig. 20). In order to maintain contact with the ordnance maintenance battalion, the station of the division ammunition officer may report into the battalion command net to handle necessary traffic.

531. ORDNANCE MAINTENANCE BATTALION COMMAND NET. The *ordnance maintenance battalion command net* (fig. 92) includes radio sets assigned to the division ordnance officer, the battalion executive, three salvage and recovery sections of

headquarters company, and each of the three maintenance companies. This radiotelegraph-telephone net provides communication for the command and control of the battalion. Company commanders are kept informed of the intended tactical employment of the combat elements of the division in order that ordnance support may be provided accordingly. Requirements for roadside recovery equipment are transmitted over the battalion command net to each of the radio sets mounted in the escort vehicles used on recovery missions. This saves considerable time and mileage which would be consumed if recovery vehicles were required to report back to headquarters company for each mission. Maintenance companies attached to or in direct support of a combat command will enter the administrative net of that combat command. They may report into the ordnance maintenance battalion command net at scheduled intervals to handle necessary traffic.

532. ORDNANCE MAINTENANCE BATTALION HEADQUARTERS NET. The voice radio sets of the battalion headquarters and headquarters company operate on the *battalion headquarters net* (fig. 92). This net is used for column control and for communication between moving vehicles.

533. ORDNANCE MAINTENANCE COMPANY COMMAND NET. Each maintenance company will operate a voice *company command net* (fig. 92). This net provides communication between the company commander and the armament and automotive platoons. Although organized into four separate

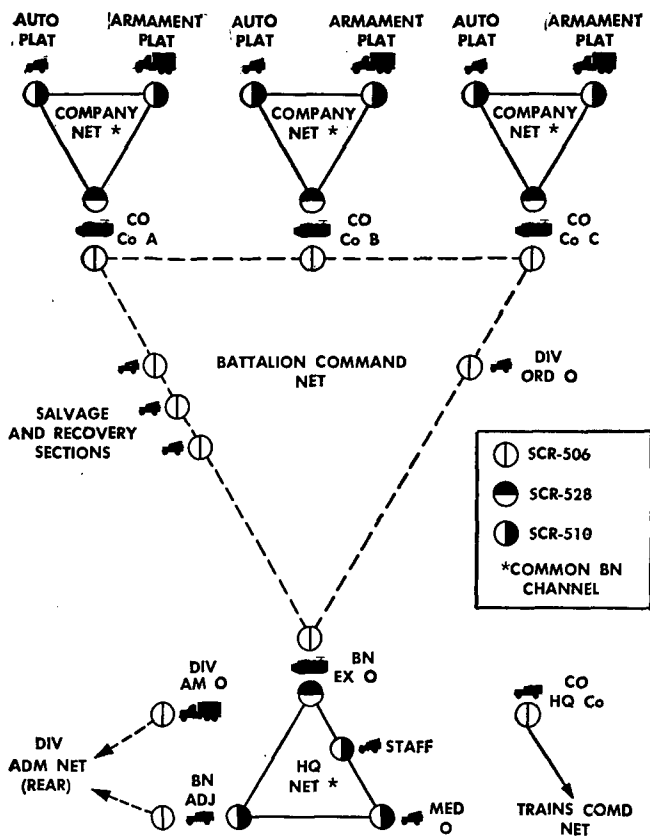


Figure 92. Typical radio nets, ordnance maintenance battalion.

nets, all voice radio sets within the ordnance maintenance battalion operate on the same channel.

534. ARMORED MEDICAL BATTALION RADIO COMMUNICATION TO HIGHER HEADQUARTERS. The battalion operates two secondary stations in nets of higher headquarters. These include a station in the *division administrative net (rear)*, and one in the *trains command net*, operated from the vehicle of the headquarters company commander. These two radiotelegraph-telephone nets provide the armored medical battalion with radio communication to the division command post and the division trains.

535. ARMORED MEDICAL BATTALION COMMAND NET. The armored medical battalion maintains radio communication with its medical companies through the *battalion command net* (fig. 93). This radiotelegraph-telephone net includes radio sets assigned to the battalion S-3 and each of the medical company commanders. Companies attached to or in direct support of a combat command normally will enter the administrative net of that combat command. They may report into the medical battalion command net at scheduled intervals to handle necessary traffic. (See fig. 31.)

536. ARMORED MEDICAL BATTALION HEADQUARTERS NET. The voice radio sets of the headquarters company operate together on the *headquarters net*. This net is used for column control and for communication between moving vehicles.

537. MEDICAL COMPANY COMMAND NET. a. Voice radio sets within each company operate together on the *company command net* (fig. 93). This net

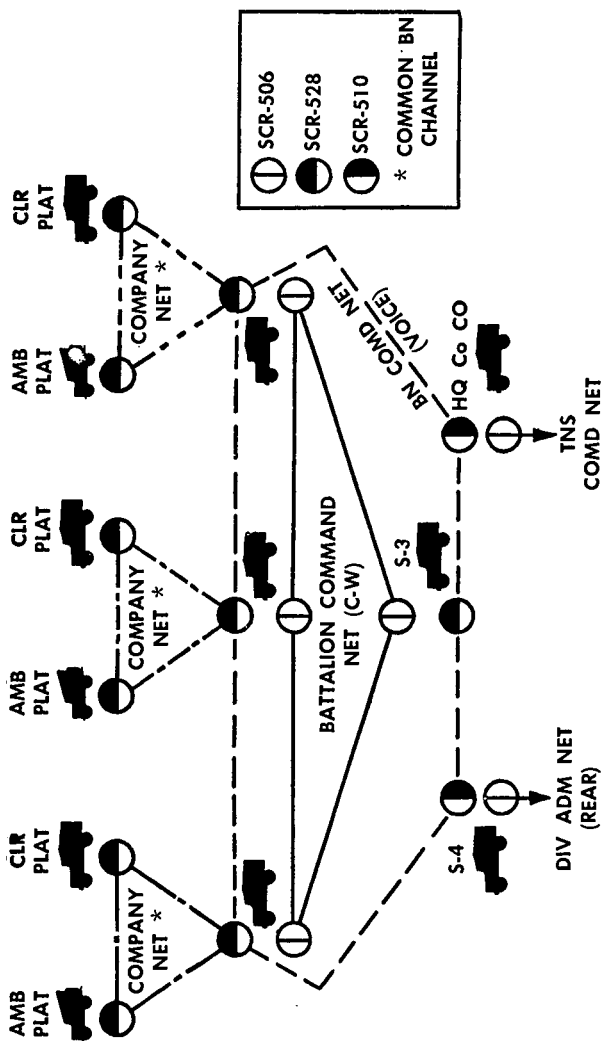


Figure 93. Typical radio nets, armored medical battalion.

provides radio communication between the company commander and the ambulance and clearing platoons. The company commander and the ambulance platoon leader will preset their voice radio sets to the channel used by the battalion medical officers of the unit they are supporting. Each battalion medical officer will preset the channel of the medical company on his voice radio set. Thus, either may establish communication with the other at any time.

b. Because of the small number of voice radio sets within the armored medical battalion, all voice nets will operate on one channel. When distances are close, it is normal to operate a *battalion command net (voice)* (fig. 93). This will allow direct voice communication between the battalion headquarters and each medical company.

538. QUARTERMASTER BATTALION RADIO COMMUNICATION TO HIGHER HEADQUARTERS. The battalion will operate a secondary station in the *trains command net*. In addition, the armored signal company will operate a high-power radio-telegraph-telephone station in the *division administrative net (rear)*. This station usually is located at the division supply control point and is available for use by the division quartermaster.

539. QUARTERMASTER BATTALION COMMAND NET. When distances permit, the *battalion command net* (fig. 94) provides voice radio communication between the battalion headquarters and the field services company, the supply company, and the medical officer. In view of the normal employment

of the battalion, the use of this net will be exceptional.

540. DIVISION TRAINS WIRE COMMUNICATION—GENERAL. The armored division trains make extensive use of wire communication during stable

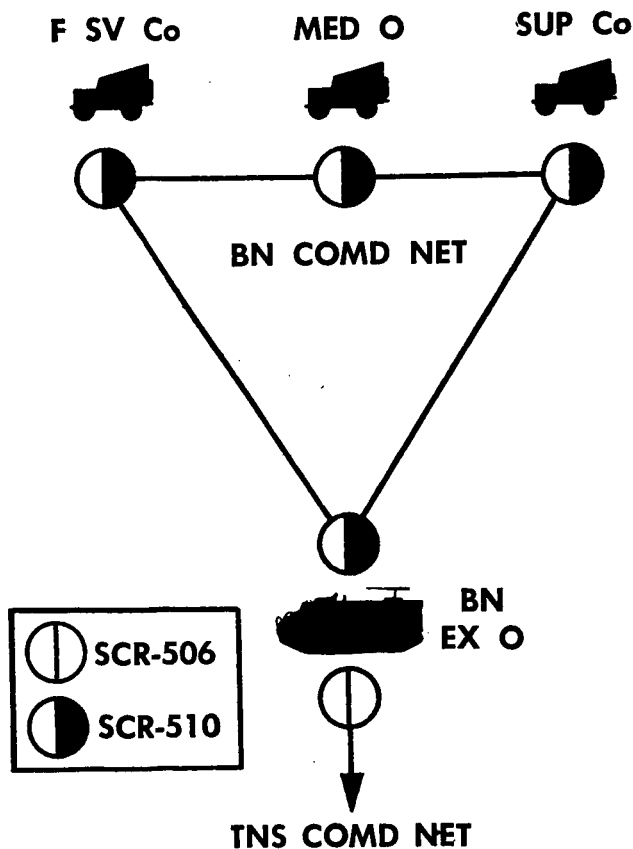


Figure 94. Typical radio nets, quartermaster battalion.

or slow-moving situations. Although wire communication provides more security and convenience than radio, the movements of units must not be delayed or otherwise restricted in order to maintain this communication. Adequate radio communication is available and is used to insure flexible employment.

541. DIVISION TRAINS WIRE COMMUNICATION TO HIGHER HEADQUARTERS. Construction teams from the armored signal company will install and maintain wire lines between division headquarters and the division trains headquarters, the division supply control point, the service battalions, and other units and installations, as required. These lines normally will be connected to the switchboard at the division headquarters rear echelon. (See fig. 95). When the division trains are separated so far from the division headquarters rear echelon that the above arrangement is not economical in personnel and equipment, the armored signal company will install a switchboard at division trains headquarters.

542. ORDNANCE MAINTENANCE BATTALION WIRE COMMUNICATION. Sufficient telephone equipment is provided for operation of a switchboard at battalion headquarters, with telephone communication to the commander and staff sections, supply section, and salvage and recovery sections. Offices of the division ordnance officer and the division ammunition officer are provided with telephones which are connected to the battalion switchboard or to the switchboard of the nearest division unit.

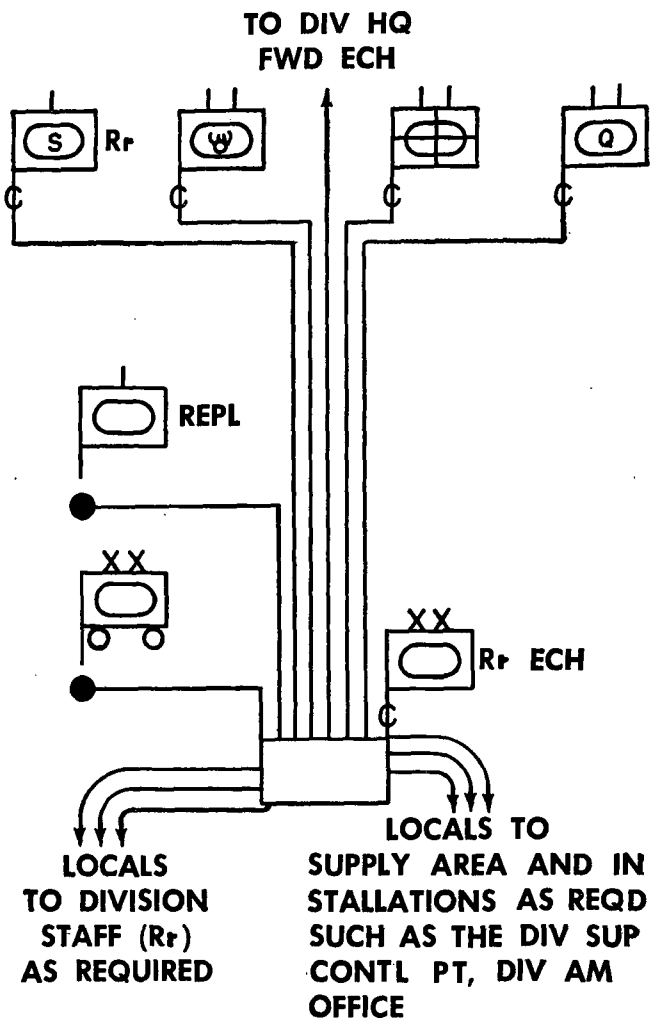


Figure 95. Typical wire system, armored division headquarters rear echelon and division trains.

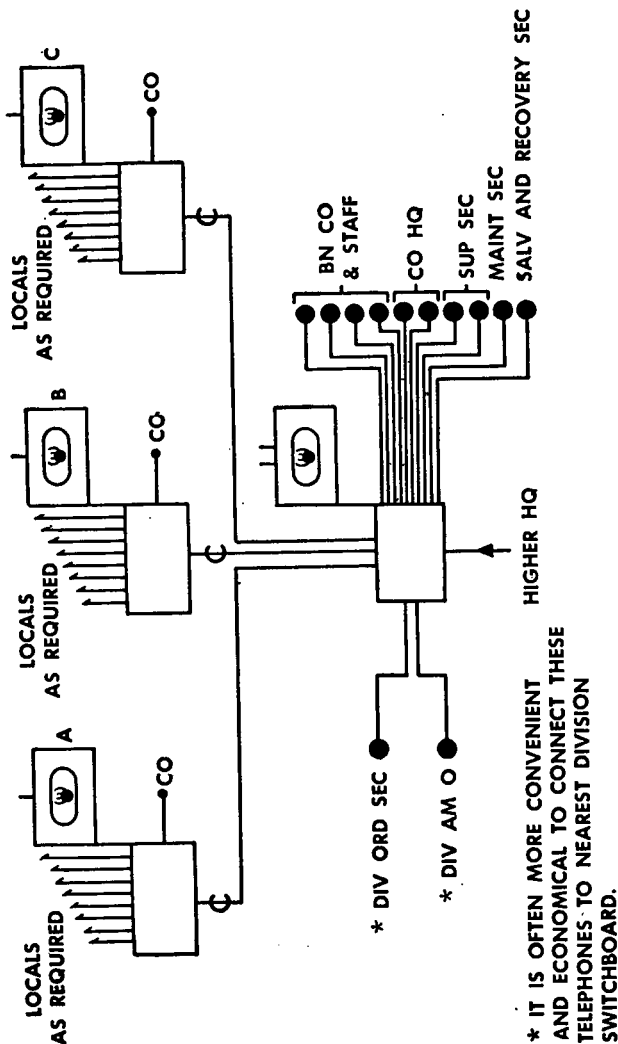


Figure 96. Typical wire system, ordnance maintenance battalion.

In addition, when the three maintenance companies are within reasonable distance, telephone communication will be established with each of their command posts. If distances are too great and the companies are near a unit such as a combat command, it is customary that the companies be connected to the switchboard of this unit and thus obtain communication to the battalion through the division telephone system. Maintenance companies attached to a combat command are provided telephone communication to its headquarters by that unit. (See fig. 96.)

543. ARMORED MEDICAL BATTALION WIRE COMMUNICATION. This battalion normally will be provided wire lines into a division switchboard by the armored signal company. Wire lines may be constructed to the medical companies, but it will be more normal for each company to be provided wire communication by the combat command that it is supporting or to which it is attached.

544. QUARTERMASTER BATTALION WIRE COMMUNICATION. This battalion normally will not maintain a battalion wire system. The armored signal company will provide local telephones at battalion headquarters and supply installations as required.

APPENDIX I

REFERENCES

- SR 110-1-1 Index of Motion Pictures and
Film Strips.
- SR 310-20 series, Military Publications
- Dictionary of United States Military Terms for
Joint Usage
- FM 5 - 6 Operations of Engineer Units
- FM 6 - 40 Field Artillery Gunnery
- FM 7 - 20 Infantry Battalion
- FM 17 - 33 Tank Battalion
- FM 17 - 50 Supply, Evacuation and Trains,
Armored Units
- FM 17 - 100 The Armored Division
- FM 21 - 8 Military Training Aids
- FM 24 - 6 Radio Operators Manual, Army
Ground Forces
- FM 24 - 16 Signal Orders, Records, and
Reports
- FM 24 - 17 Communication Center Operation
- FM 24 - 18 Radio Communication
- FM 24 - 20 Field Wire Technique
- FM 100 - 11 Signal Communication Doctrine
- FM 101 - 5 Staff Officers' Field Manual, The
Staff and Combat Orders
- TM 20 - 205 Dictionary of United States Army
Terms

APPENDIX II

RADIO SETS IN THE ARMORED DIVISION

This appendix contains photographs (figs. 98-111) of each of the different types of radio sets found in the armored division. It includes two charts (figs. 97 and 112), one outlining the characteristics of each of the radio sets found in the division, and the other showing graphically the frequency range covered by each of these radios.

RADIO SET	MAJOR COMPONENTS	FREQUENCY RANGE (MC)	TYPE MODULATION	EMISSION & RANGE	PRESET CHANNELS	POWER SUPPLY	TM OR INST. BOOK	REMARKS
 SCR-399	Transmitter BC-610 Receiver BC-312 BC-342 Aut. Tuning Unit BC-959 Speech Amp. BC-614 2 Telephones EE-8 All mounted in Shelter HQ-17	2-18 1.5-18	AM	CW, Voice 100 miles Stationary or moving	None	Power Unit PE-95	TM 11-281 TM 11-850	Ground mobile; high power radio set for providing communication either from a stationary position or while moving at relatively high speeds over rough roads. Used at division echelon generally for net control stations of certain division radio nets. Radio set is installed in Shelter, HQ-17, combined with power plant normally carried in Cargo Trailer, K-52. May be remotely controlled up to a distance of one mile using the two telephones and the field wire supplied for same.
 SCR-506	Transmitter BC-653 Receiver BC-652 Mounting FT-233	2-4.5 2-6	AM	CW-50 miles Voice-25 miles	5 (One of which is tunable)	Veh 12v or 24v battery	TM 11-630	Ground, vehicular; command radio set, designed for installation in tanks, personnel carriers and other vehicles to provide communication over distances up to 50 miles.
 SCR-536	Receiver and Transmitter BC-611	3.5-6	AM	Voice only 100 ft to 1 mile	1	1 Battery BA-37 1 Battery BA-38 (Dry cells)	TM 11-235	Ground, pack or portable; very short range but well adapted to use of dismounted infantry and other foot troops.
 SCR-508	Transmitter BC-604 2 Receivers BC-603 Mounting FT-237	20-27.9	FM	Voice only 10-15 miles	10 (Pushbutton controlled)	Veh 12v or 24v battery	TM 11-600	Ground, vehicular; voice command set designed for installation in tanks, personnel carriers and other vehicles. Transmitter contains interphone amplifier for use in tanks. Used by practically all armored unit commanders.
 SCR-528	SAME AS SCR-508 EXCEPT THERE IS ONLY ONE RECEIVER							Installed in all tanks which do not have an SCR-508, used by many staff officers where there is no requirement for simultaneous two-net operation.
 SCR-510	Receiver and Transmitter BC-620 Plate Supply Unit PE-97 Mounting FT-250 Case CS-79	20-27.9	FM	Voice only 5 miles	2	Veh 6v or 12v battery with Plate Supply Unit, PE-97 and one battery BA-41	TM 11-685	Ground, general ground use; low power set designed for communication over short ranges. Used extensively by the armored infantry and engineer battalions for tactical purposes; also used by staff officers for local control of marching columns. May be dismounted from vehicle and operated as a portable set, thus becoming an SCR-509.

Figure 97. Technical characteristics of radio sets used in armored type units.

	Receiver and Transmitter BC-670 Cave CS-79	20-27.9	FM	Voice only 3 miles	2	1 Battery BA-39 1 Battery BA-40 1 Battery BA-41	TM 11-603	Ground, pack; used by artillery forward observers while dismounted and by the dismounted armored infantry.
	Receiver and Transmitter BC-1000	40-48	FM	Voice only 3 miles	None (Tunable to 41 channels)	1 Battery BA-70, or 1 Battery BA-80	TM 11-242	Ground, pack or portable; low power and short range. Used by the dismounted armored infantry companies and platoons.
	Receiver and Transmitter BC-1000 Mounting FT-250 Power Supply Unit PP-114/VRC	40-48	FM	Voice only 3 miles	None (Tunable to 41 channels)	Or, 12v, or 24v Veh battery with Power Supply Unit, PP-114/VRC	TM 11-437	Ground, vehicular; designed for installation in tanks and other vehicles to provide communication between these vehicles and dismounted troops using the SCR-300.
	2 Transmitters T-14/TRC-1 2 Receivers R-19/TRC-1 3 Telephones EE-8 and terminal equipment	70-100	FM	Voice only 123 miles, (line-of-sight)	1	Power Unit PE-73	TM 11-2601 TM 11-900	Ground, transportable; designed to provide continuous 24-hour-a-day service as a four-channel carrier telephone radio terminal used in conjunction with carrier Telephone Terminal CF-1. When the radio circuit is used as a link in the spiral-four carrier telephone system, the carrier telephone terminal is located at the terminal of the wire system rather than at the radio terminal.
		100-156	AM	Voice only	8	24-volt battery		Airborne; or two-way plane-to-plane and plane to ground communication. Automatic tuning of transmitter and receiver upon insertion of crystal.
	Receiver-transmitter RT-77/GRC-9 Vibrator Power Unit PE-227 Generator GN-58 Mounting MT-350/GRC-9	2-12	AM	CW-73 miles stationary 30 miles moving Voice-23 miles stationary 15 miles moving	None	Vibrator Power Unit PE-227 (when mounted) or Generator GN-58 hand powered (when dismounted) or Battery BA-48 (receiver only)	TM 11-263	Ground, general ground use, medium power set designed for medium range operation. Set may be operated from moving or stationary vehicles, as a ground transportable station, and as a battery operated set for standby operations.
	Radio receiver BC-728-A Mounting FT-328-A	2-6	AM	Voice	4	Battery BB-54-A	TM 11-839	Radio receiver designed for both portable and vehicular installation and operation.

Figure 97. Technical characteristics of radio sets used in armored type units—Continued.

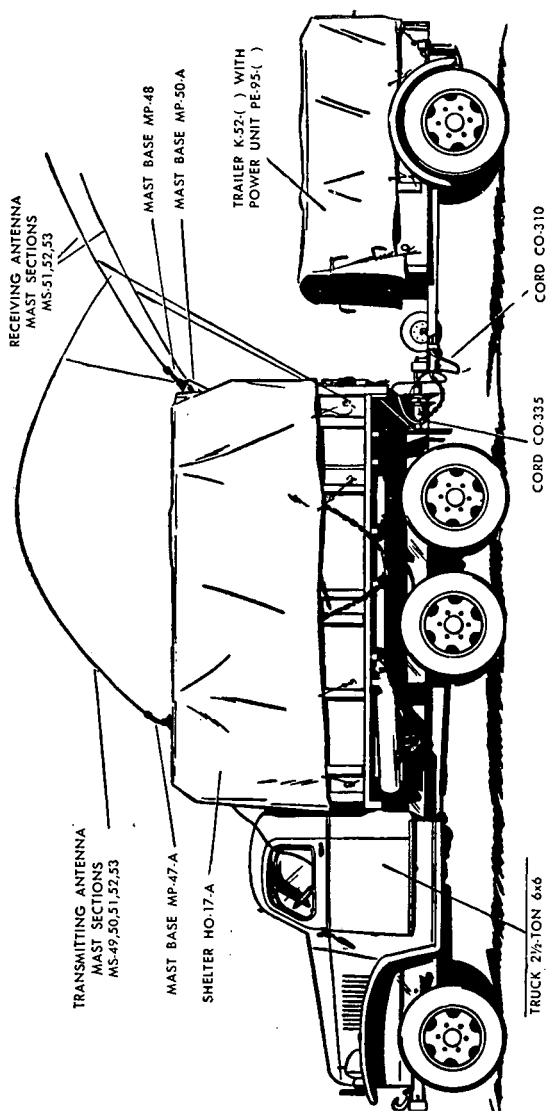


Figure 98. Radio Set SCR-399 installed as a mobile station.

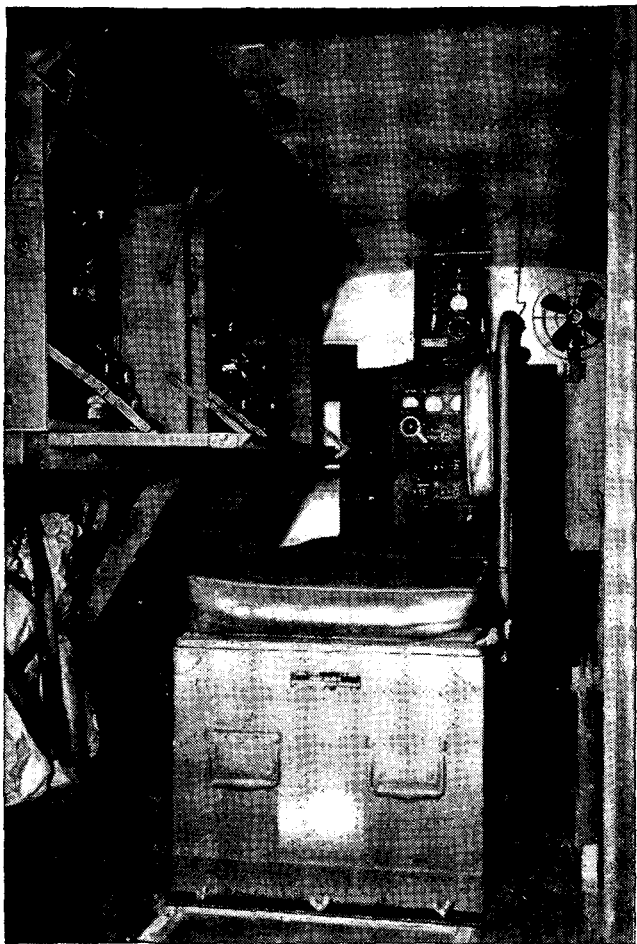


Figure 99. Radio Set SCR-399 installed in Shelter HO-17.

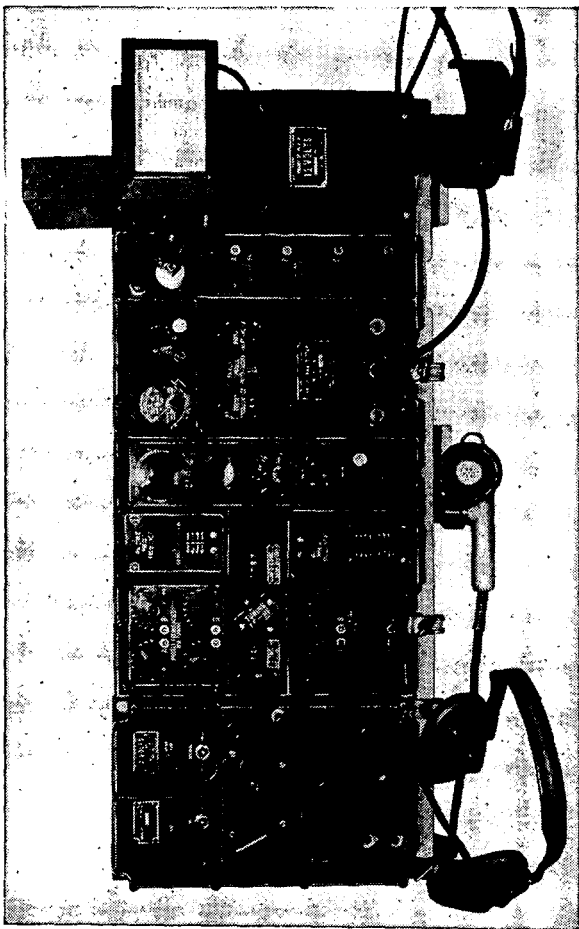


Figure 100. Radio Set SCR-506.



Figure 101. Radio Set SCR-536 in operation.

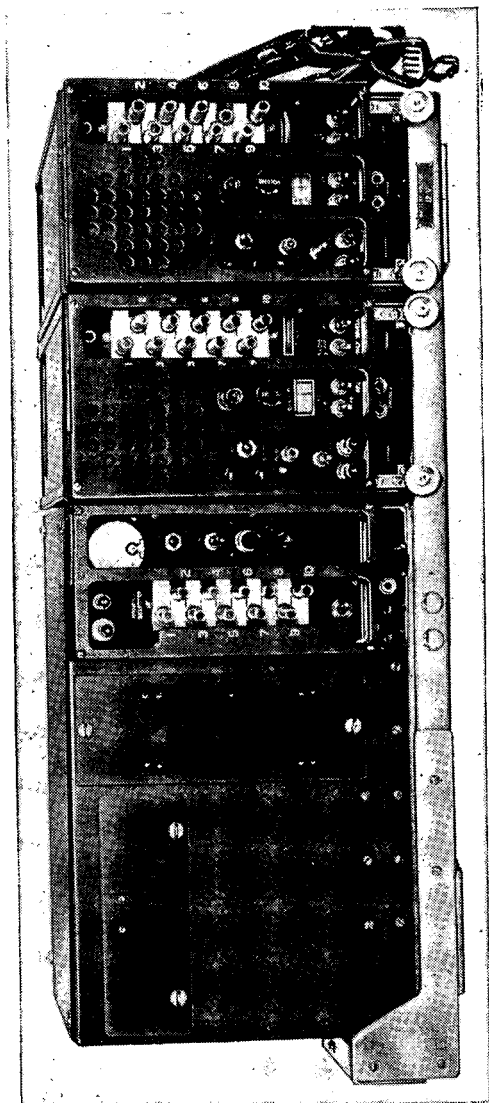


Figure 102. Radio Set SCR-508.

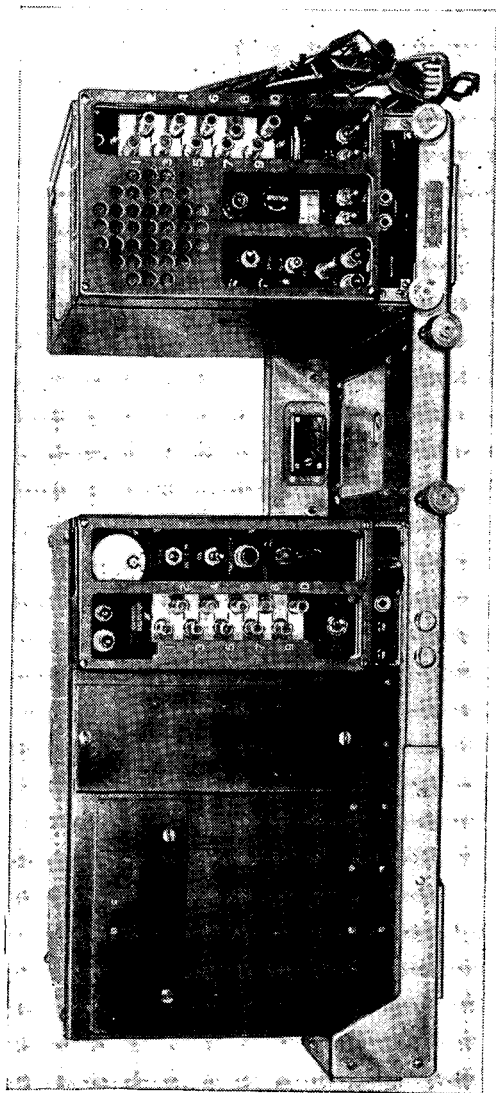


Figure 103. Radio Set SCR-528.

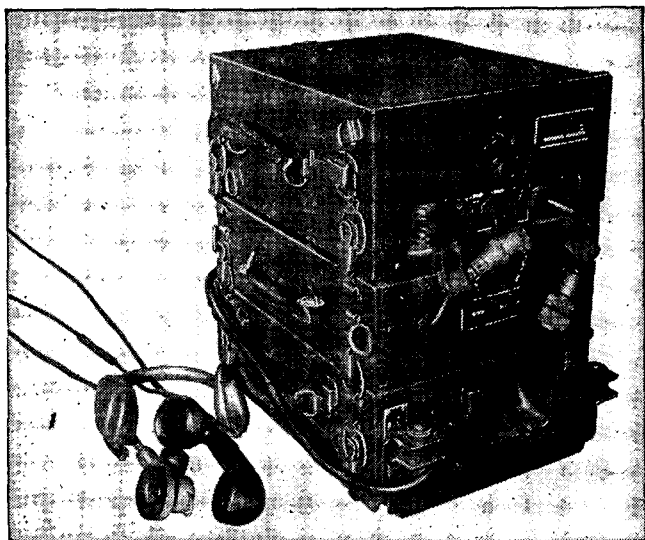


Figure 104. Radio Set SCR-510.

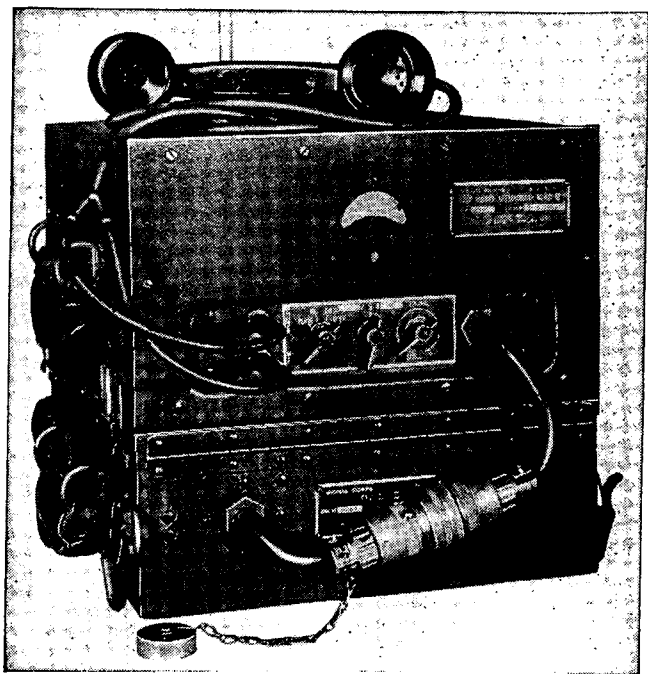


Figure 105. Radio Set SCR-509.



Figure 106. Radio Set SCR-300 in operation (with carrying straps).

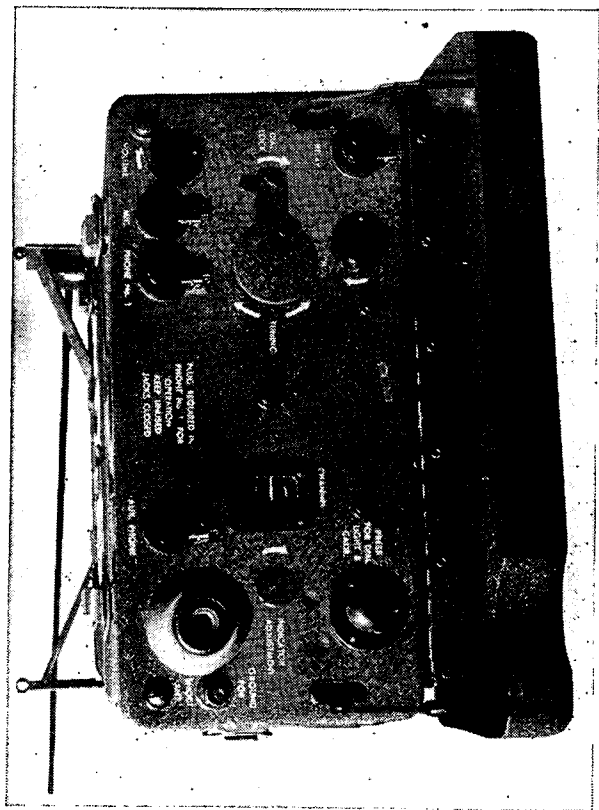




Figure 108. Radio Set SCR-300 in operation (with pack-board).

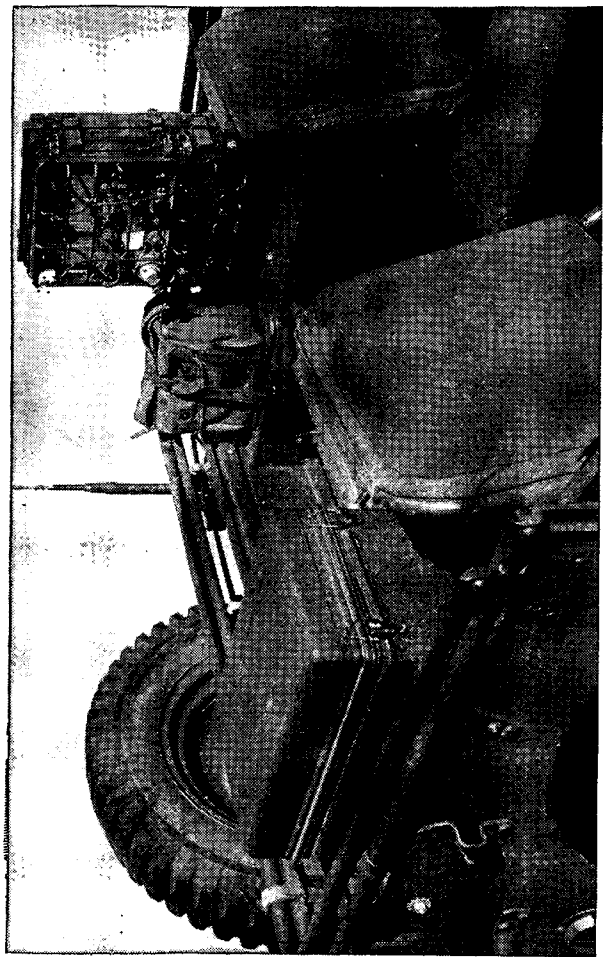


Figure 109. Radio Set AN/GRC-9 installed in 1/4-ton truck.

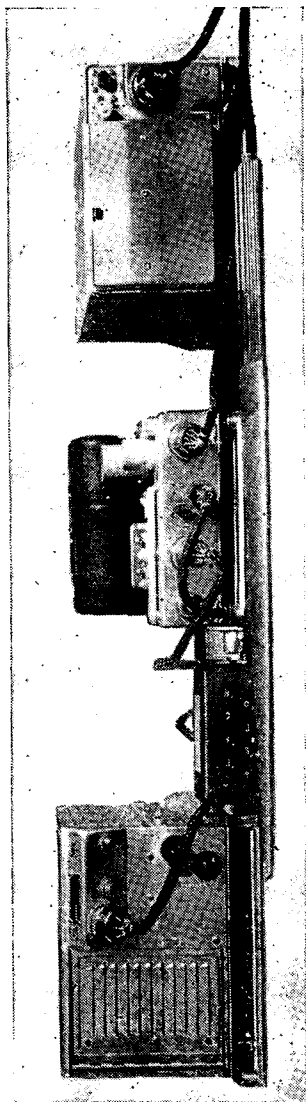


Figure 110. Radio Set AN/ARC-3.

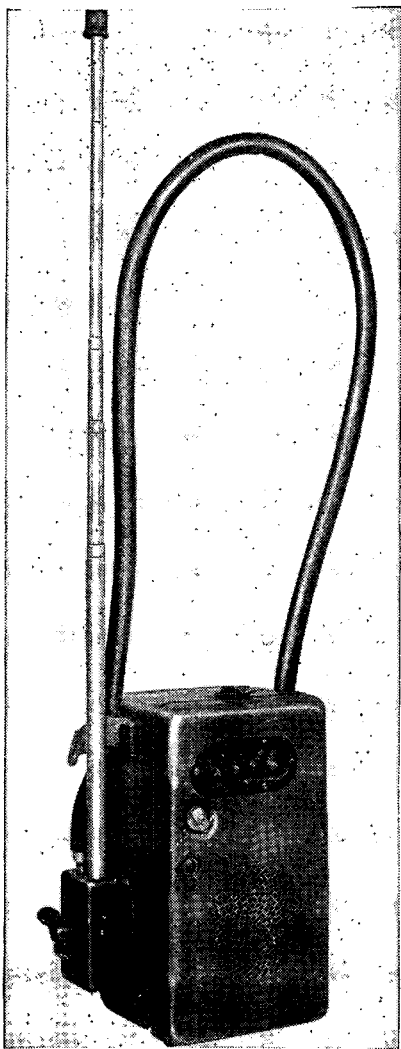


Figure 111. Radio Set SCR-593.

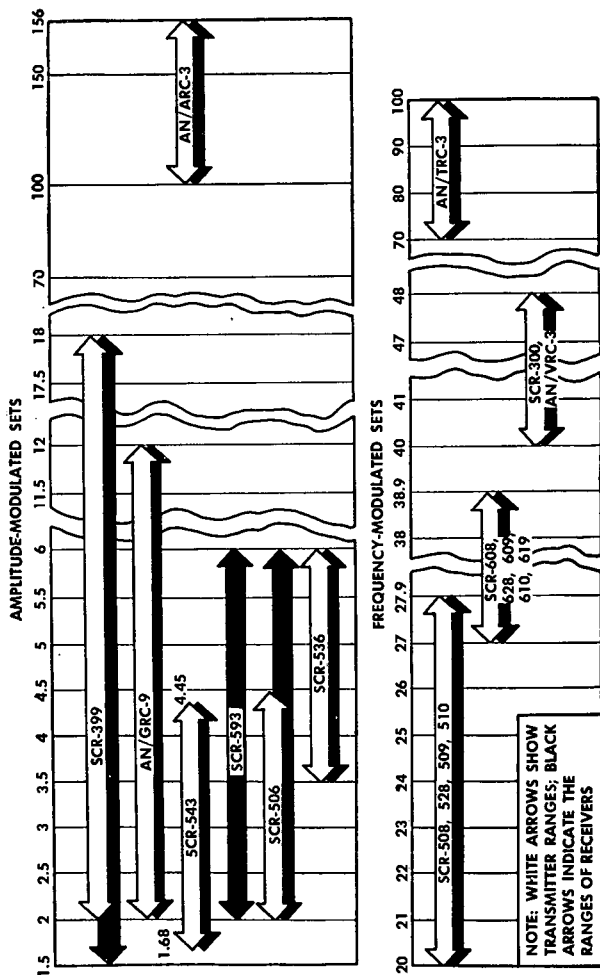


Figure 112. Frequency spectrum chart.

APPENDIX III

NEW FAMILY OF VOICE (F-M) RADIO SETS

1. GENERAL. A series of radio sets designated during development as a "Family of Radio Sets AN/GRC-3 through -8" has been adopted as standard type to provide ground and vehicular frequency-modulated (F-M) voice and, by addition of other newly adopted equipments, teletype communication as well, for use by all combat arms in forward areas where short- and medium-range (up to approximately 15 miles) radio communication is required.

a. The AN/GRC-3 can be considered as completely replacing the SCR-508 and AN/VRC-3; the AN/GRC-4 can replace the SCR-528 and AN/VRC-3. Likewise, the AN/GRC-5 and -6 are designed to replace the SCR-608 and -628 while providing additional signal communication features never before furnished—such as an additional low-power short-range F-M radio set, local and remote controls, plus a retransmission device. In vehicles having interphone sets, the installations will provide an interphone amplifier not integral with the SCR-508, -528, -608, and -628.

b. The AN/GRC-7 and -8 also are available to extend the frequency range of this series of radio sets to 54.9 MC. Within the series, complete cov-

erage of the frequency spectrum 20.0–54.9 MC is provided, with a 10-channel overlap between adjacent bands of frequencies. Thus, there are 350 channels for medium-power radio sets now available for assignment in the field army, each being spaced 100 KC from another without resort to the crystal “banks” and realinement procedures formerly required in the SCR-508 and -608 series. In addition, the presence of Transmitter-Receiver RT-70 (47.0–58.4 MC) provides 115 F-M channels for assignment to low-power equipment. However, 80 of these channels are within the overlap of the AN/GRC-7 and -8 (47.0–54.9 MC). Of these 115 channels, 43 will be available in the AN/PRC-6, the replacement for the “handie-talkie” Radio Set SCR-536, soon to be available to the field army. All channels of this series of radios can be read directly from the dial mechanism, and the transmitter, receiver, and antenna are tuned by setting direct-reading dials.

c. Further combinations of components of this series provide other sets—AN/VRQ-1, -2, -3; AN/VRC-7, -8, -9, -10, -13, -14, -15; and AN/PRC-16—which provide additional special features and flexibility for many purposes.

d. This equipment increases the radio channels available to units requiring voice radio communication, since the RT-69 transceiver (a component of the AN/GRC-7 and -8 equipment) and the RT-70 transceiver provide 170 15-watt channels and 115 1-watt channels, respectively. The increased capabilities of the new equipment will be realized in proportion to the care with which

the equipment is distributed among the components of divisions, with operating channel assignments judiciously made.

2. RADIO SET AN/GRC-3. a. Radio Set AN/GRC-3 (figs. 113-115) is made up of the following major components:

- (1) One "A" set, receiver-transmitter (20.0-27.9 MC).
- (2) One auxiliary receiver (20.0-27.9 MC).
- (3) One "B" set, receiver-transmitter (47.0-58.4 MC).
- (4) One power supply for "A" set.
- (5) One interphone amplifier and power supply for "B" set.
- (6) One mounting base with provision for mounting either remote control unit or automatic retransmission unit (both units are supplied).

b. The AN/GRC-3 is similar in capability to the SCR-508, inasmuch as it contains one transmitter and two receivers. It is not possible to state definitely that an AN/GRC-3 and -4 will replace *each* SCR-508 and -528 now authorized in the armored division; however, this direct substitution will be made in many cases. For example, within the tanks of the armored division, AN/GRC-3's will replace the majority of all SCR-508's, and AN/GRC-4's will replace the majority of all SCR-528's, now authorized. The AN/VRC-3 will be eliminated completely. Its place will be taken by the "B" set, which is a component of each set of the AN/GRC-3 through -8 series. The

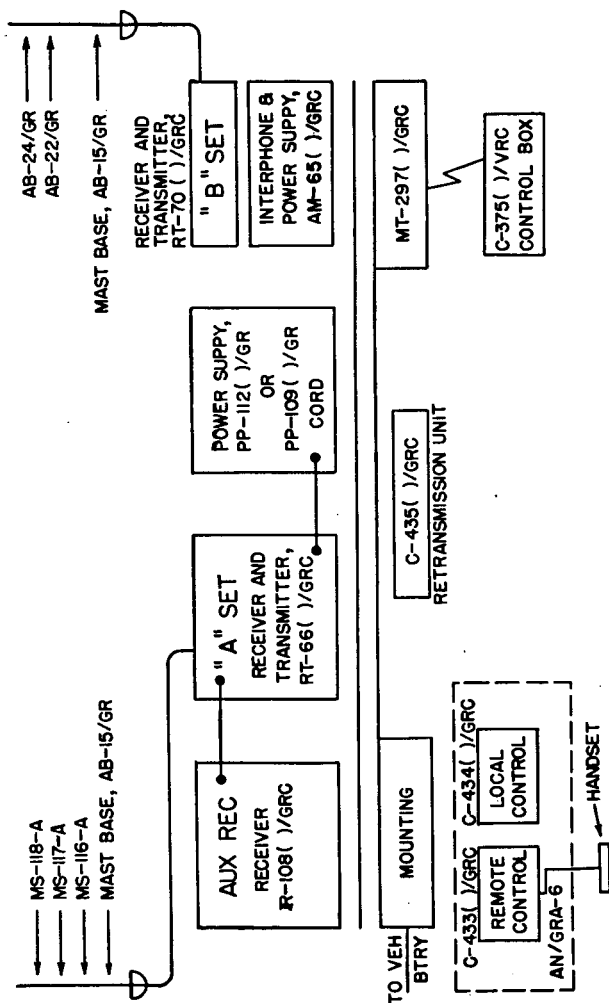


Figure 113. Block diagram of Radio Set AN/GRC-3.

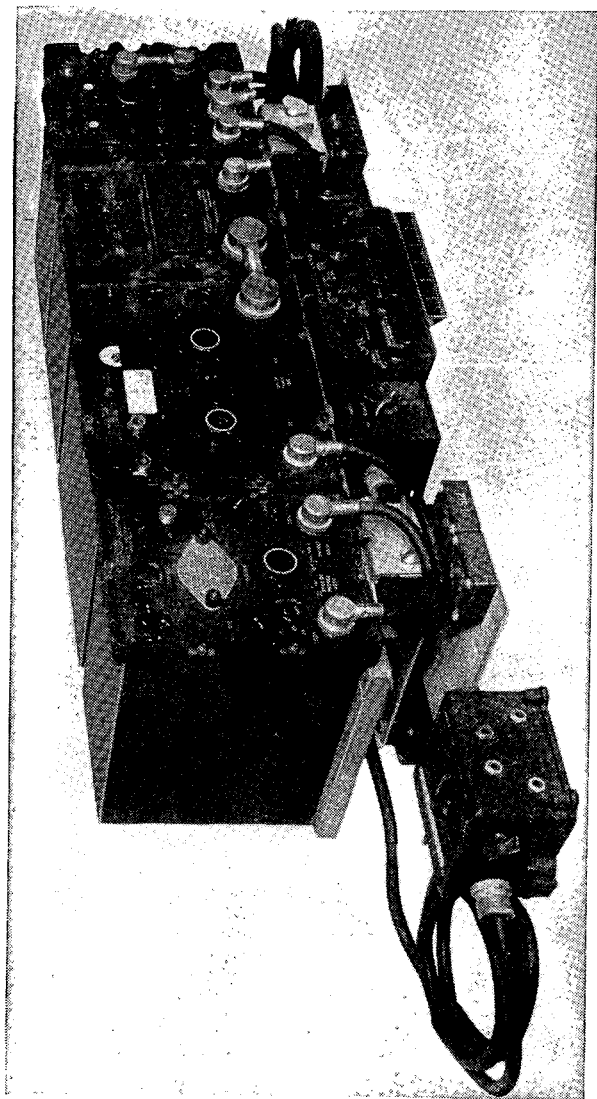


Figure 114. Radio Set AN/GRC-3.

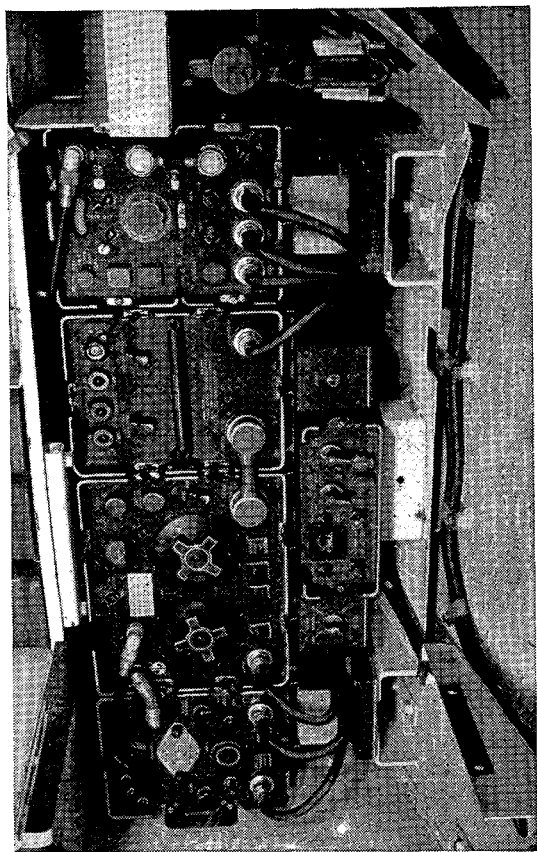


Figure 115. Radio Set AN/GRC-3 mounted in tank.

exact radios or combination of radios which will replace the SCR-508's and -528's now found within the numerous headquarters of the armored division will have to be determined after exhaustive field tests.

3. RADIO SET AN/GRC-4. Radio Set AN/GRC-4 (figs. 116 and 117) is composed of the same major components as is Radio Set AN/GRC-3, except that the auxiliary receiver is eliminated. A logical substitution of AN/GRC-4's for SCR-528's can be accomplished within the tanks of tank platoons.

4. RADIO SET AN/VRQ-1. Radio Set AN/VRQ-1 (fig. 118) eliminates the "B" set entirely as well as the auxiliary receiver and the interphone amplifier, but adds an additional "A" set transceiver and power supply. It retains the automatic retransmission unit. This set is designed for use in those cases where a "B" set and interphone amplifier are not required but two long-range sets are required. Although there is no radio now in use which corresponds to this particular set, it is probable that it will replace certain SCR-508's now authorized. One desirable feature of this combination is the fact that the "A" set of the AN/GRC-5, -6, -7, or -8 can be mounted and operated on the same base with the "A" set of the AN/GRC-3 and -4. Therefore, artillery battalions can make good use of this radio set to maintain contact with divisional units and nondivisional artillery units equipped with AN/GRC-5 and -6 series radios.

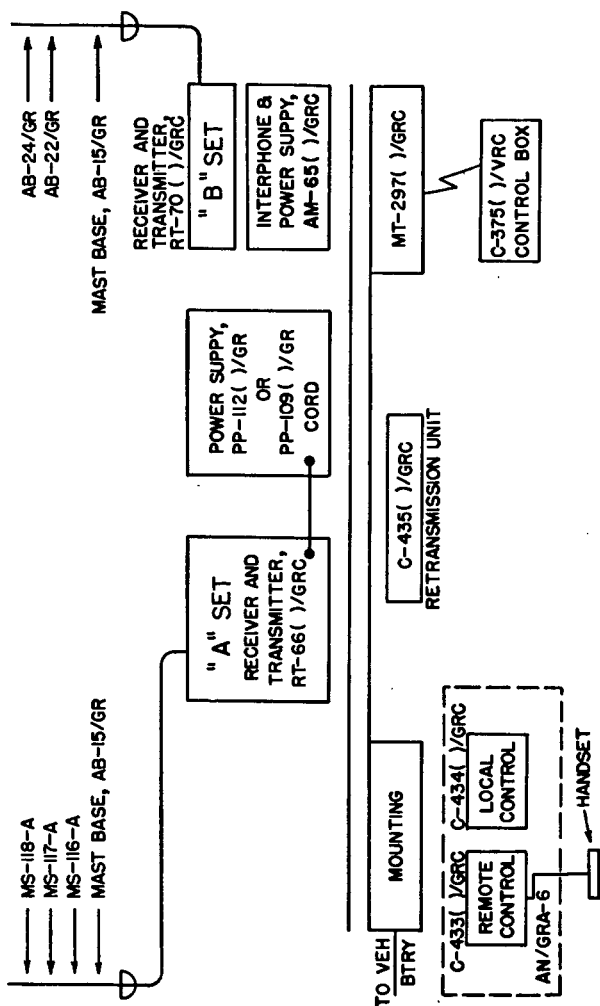


Figure 116. Block diagram of Radio Set AN/GRC-4.

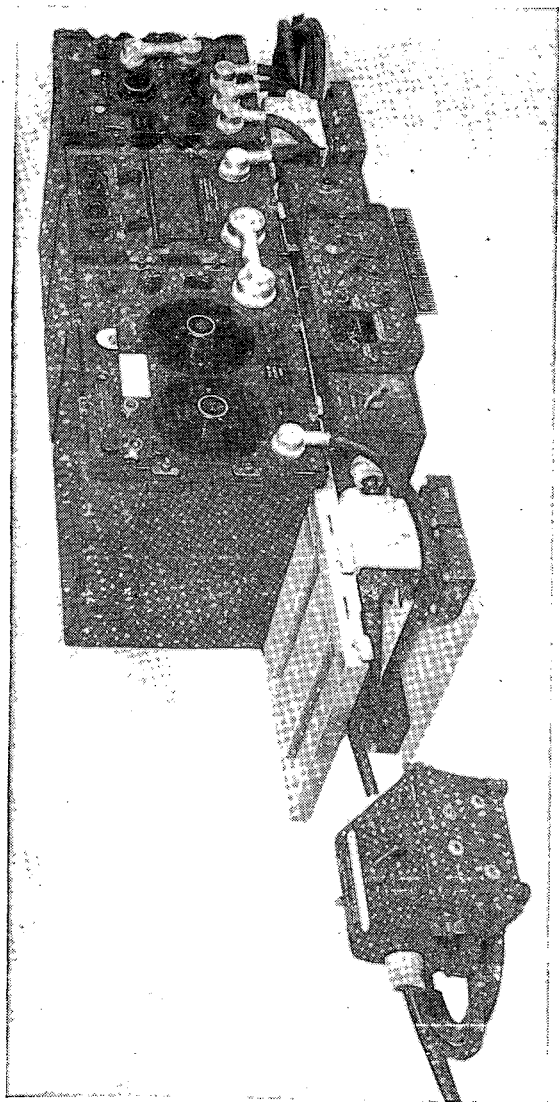


Figure 117. Radio Set AN/GRC-4.

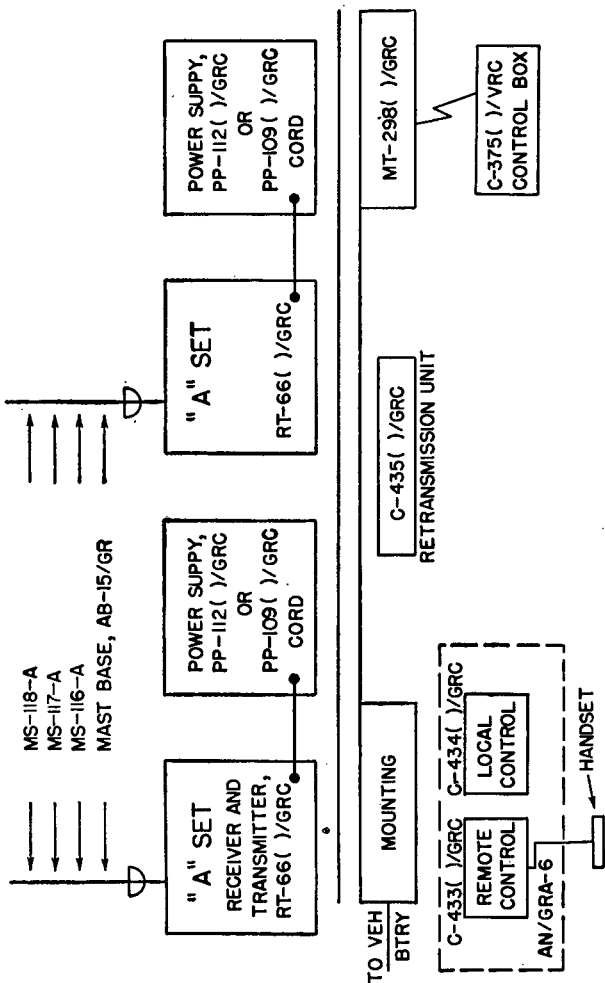


Figure 118. Block diagram of Radio Set AN/VRQ-1.

5. RADIO SET AN/VRC-8. Radio Set AN/VRC-8 (figs. 119 and 120) is, in effect, actually one "A" set with its power supply and remote control facility but no automatic retransmission. Certain liaison officers could use this radio effectively.

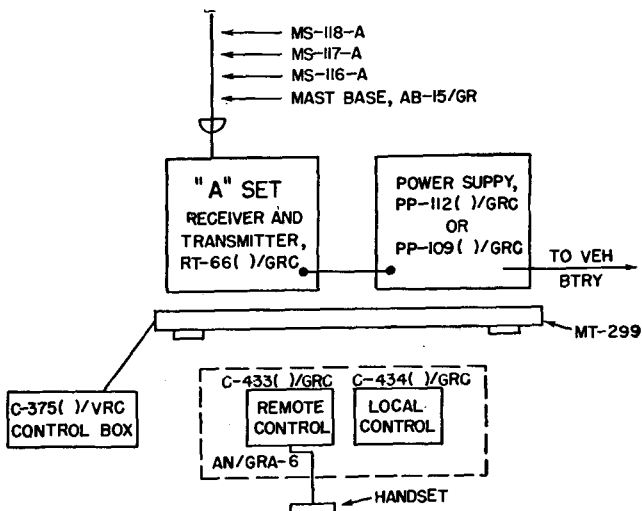


Figure 119. Block diagram of Radio Set AN/VRC-8.

6. RADIO SET AN/VRC-7. Radio Set AN/VRC-7 (figs. 121 and 122) consists of a "B" set with interphone amplifier and remote control units. It is used where both interphone and short-distance radio communication are desired. An example of possible use is for an artillery self-propelled mount where interphone communication is used within the vehicle and radio communication occasionally is required between vehicles until wire is installed.

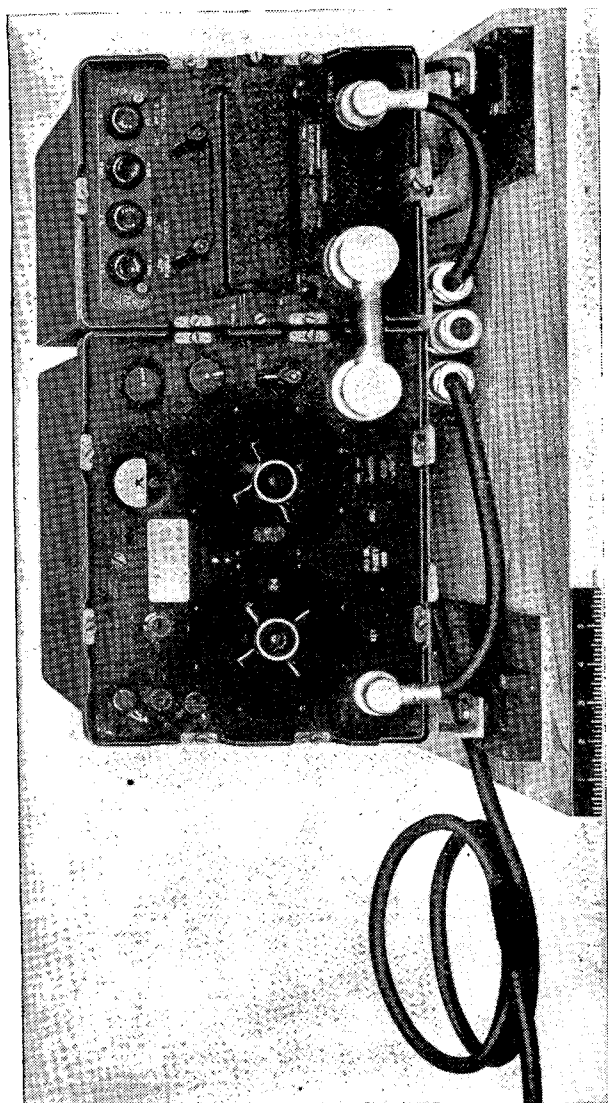


Figure 120. Radio Set AN/VRC-8.

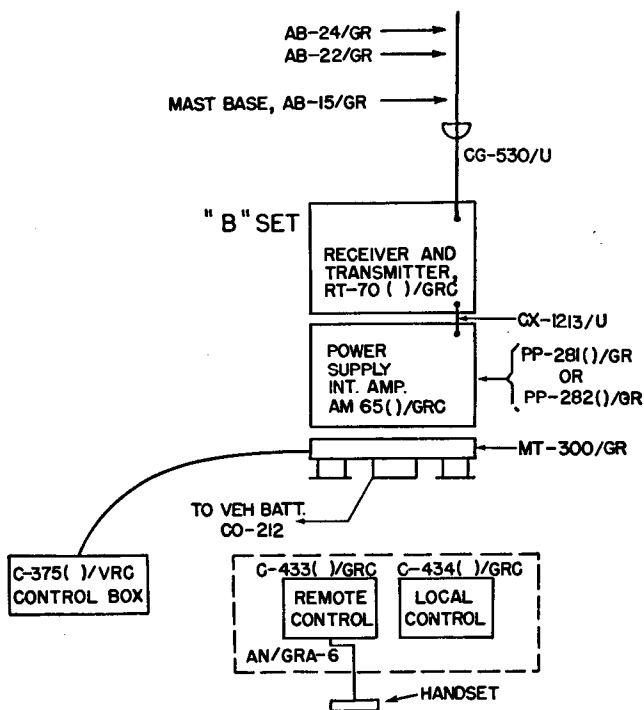


Figure 121. Block diagram of Radio Set AN/VRC-7.

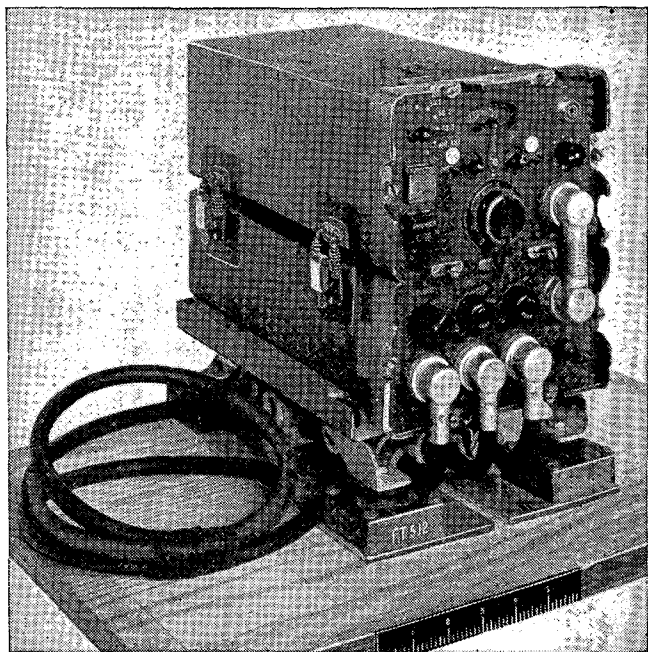


Figure. 122. Radio Set AN/VRC-7.

7. RADIO SET AN/PRC-16. Radio Set AN/PRC-16 (fig. 123) is the "B" set equipped with batteries and intended for ground use or for use in aircraft. This set will communicate with the "B" set in the tank, or other sets in its frequency range, and may be used for infantry-tank communication and other uses until more portable sets—AN/PRC-6 and AN/PRC-8, -9, and -10 (figs. 124 and 128)—now under development have been standardized and produced.

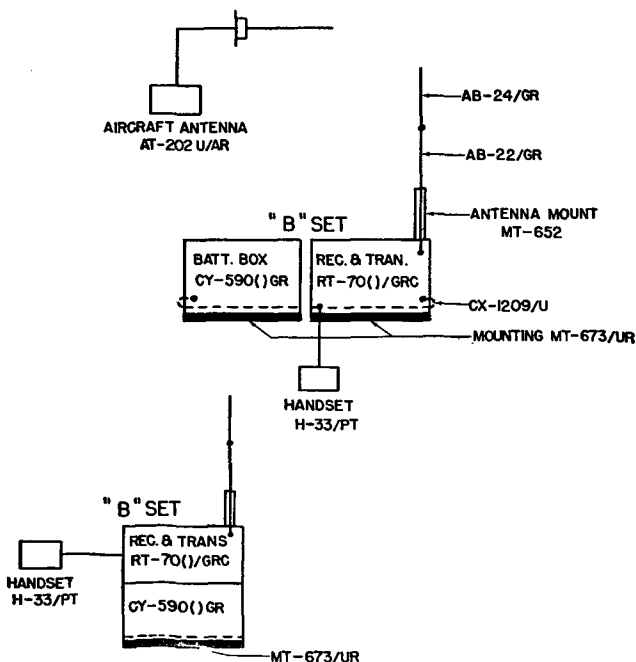


Figure 123. Block diagram of Radio Set AN/PRC-16.

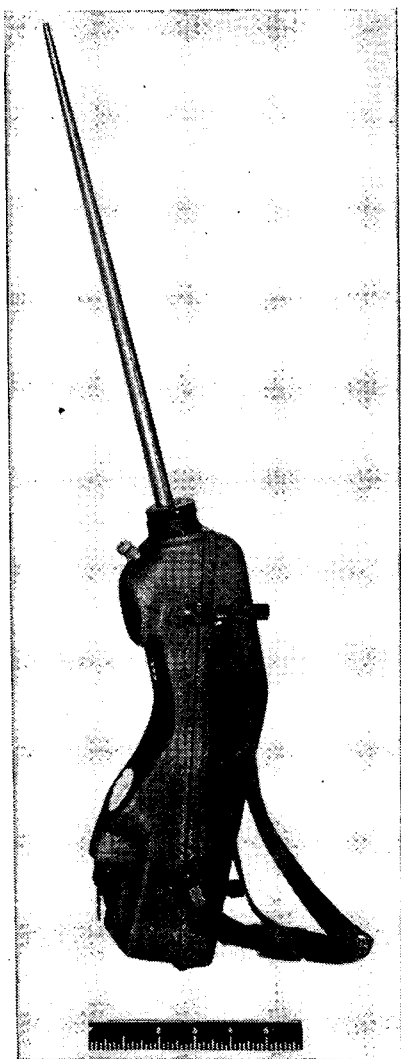


Figure 124. Radio Set AN/PRC-6.

8. FLEXIBILITY. Thus, it can be seen that, by simple rearrangement of the same basic components, an extremely flexible means of communication has been developed. The AN/GRC-5 and -6, AN/VRQ-2, and AN/VRC-9 lend the same measure of flexibility to artillery and the AN/GRC-7 and -8, AN/VRQ-3, and AN/VRC-10 to infantry.

9. ADVANTAGES OVER PRESENT SERIES. From the commander's standpoint, the new family of radio sets possesses certain definite advantages over the present series. Briefly, these are as follows:

a. In the SCR-508-528 series, a separate crystal is used to control each of the 80 available channels. Only 10 of these 80 channels can be preset for immediate use. These 10 selected channels must be preset for operation by a radio repairman, who must retune the radio each time a channel other than one of the selected 10 is desired. In the AN/GRC-3 and -4, eight crystals take the place of 80. These eight crystals are part of the radio set; once they are set, no further change need be made in order for the individual operating the radio to select any one of the 80 channels which now are available for immediate use.

b. The tuning dials of the auxiliary receiver and the "B" set have three and two detent positions, respectively, that may be set by the user of the equipment. This allows the user to pick three channels on the auxiliary receiver, or two on the "B" set, and find the dial positions easily without having to look at the dials. Each channel or frequency of the transmitter-receiver of the "A"

set is detented so that turning the dial will give a definite click. Thus, the operator can change frequencies by counting the clicks from a known channel setting when he is unable to see the dial easily. Changing frequency with these sets is not as easy and convenient as changing frequency of the preset channels of the SCR-508. However, the additional flexibility provided by continuous tuning of all channels more than makes up for the slight loss of ease of channel changes.

c. The range of the "A" sets is about the same as that of the SCR-508. However, due to the fact that crystal changes will not be necessary, the "A" sets will stand a better chance of staying in correct alinement and maintaining a high level of output. The range of the SCR-508 often was cut by incorrect alinement by the radio repairman during crystal changes.

d. The new sets provide for remote control—operating and controlling a radio set from a point located at some distance from the radio set.

e. Provision has been made in the new sets for automatic retransmission.

f. Teletype equipment can be integrated into the radio system.

g. Provision is made for integration of the "A" set into a wire telephone system. Two "A" sets may be used to replace field wire circuits for any distance within the distance range of the sets. The sets may be connected to telephones or through switchboards. Full duplex operation is possible; and, with additional accessory equipment, provision is made for ringing through to

signal switchboards or telephones. As far as the user of the telephone is concerned, operation of the radio wire integration is the same as if wire lines were used.

h. The automatic retransmission feature incorporated in the AN/GRC-3 through -8 radio sets provides a method to receive a message on one frequency and to transmit it simultaneously on another frequency with no assistance from an operator. For example, an incoming message received on the "B" set of an AN/GRC-3 is to be relayed to another station over the "A" set. Without the retransmission feature, the operator of the AN/GRC-3 would have to receive the message on the "B" set, receipt for it, and then transmit the message over the "A" set. With the retransmission feature, this is done automatically. To illustrate more clearly the function of the remote control and the retransmission feature, figures 125 and 126 show methods of operation of the Radio Sets AN/GRC-3 through -8.

- (1) Assume that a forward observer has been sent out to a position some miles from his artillery battalion (fig. 125). He is equipped with a $\frac{1}{4}$ -ton vehicle mounting a "B" set and remote control equipment. Because of the distance, the transmissions of the forward observer cannot be received directly by the artillery fire-direction center without being relayed through an intermediate station. Consequently, the artillery liaison officer, located at the headquarters of the unit

being supported, establishes an automatic relay station by use of the AN/GRC-3 mounted in his vehicle. The artillery liaison officer uses the "B" set to maintain contact with the forward observer and the "A" set to maintain contact with the artillery fire-direction center. The forward observer connects the remote-control unit to his "B" set. As he proceeds to a good observation point, he reels out assault wire, one end of which is attached to the remote-control equipment at the set and the other end to the lightweight remote-control unit that he carries. When the forward observer desires to send a message, he presses the switch on his handset or microphone. This action automatically turns on the "B" set. His message is transmitted over the telephone through the "B" set in his $\frac{1}{4}$ -ton vehicle and is received by the "B" set in the liaison officer's vehicle, and then is retransmitted automatically over the "A" set to be received by the "A" set in the artillery battalion fire-direction center. Any answer from the fire-direction center is received directly at the observation position.

- (2) Another typical use of automatic retransmission is shown in figure 126. Here, an armored infantry battalion commander is in a forward position and

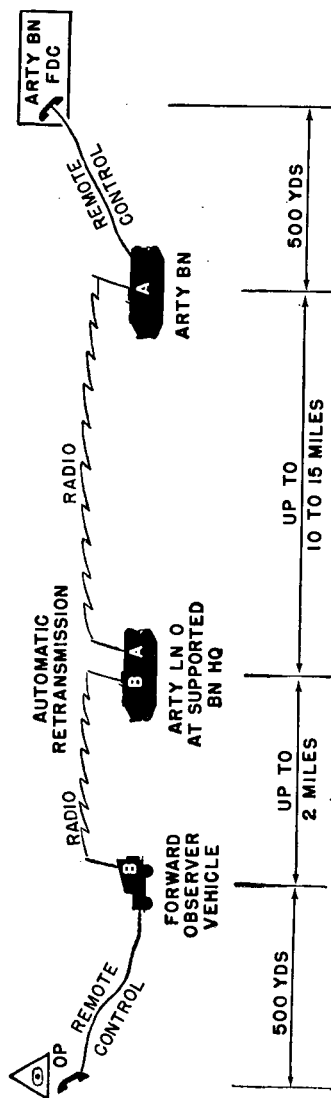


Figure 125. Typical use of remote control and automatic radio retransmission.

is using a portable voice set for communication. To maintain communication with his combat command commander, he has placed his radio-equipped $\frac{1}{4}$ -ton vehicle to the rear so that its radio set can be used to retransmit messages automatically between his position and the combat command headquarters. In this situation, the combat command commander operates the radio set remotely controlled through a switchboard. These are only two of the many possible uses of the remote control and automatic retransmission features.

i. The new sets have made maximum use of standard parts and interchangeable components so that supply and maintenance, whether for armor, artillery, or infantry, will be greatly simplified.

j. The interphone amplifier is a separate unit and is not a portion of the radio set itself. This is an advantage in that it allows interphone operation even though the radio has become inoperative. Further, this type of construction prevents blocking out either the "A" set or the "B" set when the interphone is in use. Consequently, both the interphone and the radio sets can be operated simultaneously without fear of interference.

10. COMPARISON. For a comparison of the differences between the present sets SCR-508-528 and SCR-300, and the new sets AN/GRC-3 and -4 and AN/PRC-16, see figure 127.

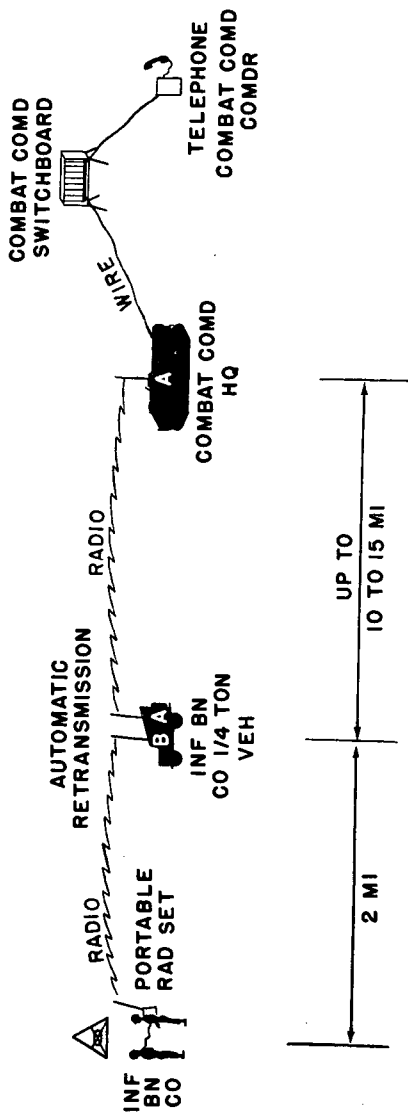


Figure 126. Typical use of automatic radio retransmission and wire-radio integration.

RADIO SET	USE	MAJOR COMPONENTS	TUNING	ADDITIONAL FEATURES	FREQUENCY RANGE IN MEGACYCLES (MC)								
					20	25	30	35	40	45	50	55	60
SCR 508	Armored	1 transmitter 2 receivers	push buttons (10 preset)	interphone		80 chan							
SCR 528	Armored	1 transmitter 1 receiver	push buttons (10 preset)	interphone		80 chan							
SCR 608	Artillery Infantry	1 transmitter 2 receivers	push buttons (10 preset)	interphone			120 chan						
SCR 300 AN/VRC-3	As required	1 transceiver	continuous tuning	none						41 chan			
AN/GRC-3	Armored	1 transceiver ("A" set) 1 Aux receiver 1 transceiver ("B" set)	continuous tuning	interphone, remote control, retromission, radio-wire Integration		"A" set 80 chan Aux rec 80 chan "B" set 115 chan							
AN/GRC-4	Armored	1 transceiver ("A" set) 1 transceiver ("B" set)	continuous tuning	interphone, remote control, retromission		"A" set 80 chan							"B" set 115 chan
AN/GRC-5	Artillery	same as AN/GRC-3	continuous tuning	same as AN/GRC-3			"A" set 120 chan Aux Rec 120 chan						"B" set 115 chan
AN/GRC-6	Artillery	same as AN/GRC-4	continuous tuning	same as AN/GRC-4			"A" set 120 chan						"B" set 115 chan
AN/GRC-7	Infantry	same as AN/GRC-3	continuous tuning	same as AN/GRC-3			"A" set 170 chan Aux rec 170 chan						"B" set 115 chan
AN/GRC-8	Infantry	same as AN/GRC-4	continuous tuning	same as AN/GRC-4						"A" set 170 chan			"B" set 115 chan
AN/PRC-8	Armored	1 transceiver	continuous tuning	none		80 Chan							
AN/PRC-9	Artillery	1 transceiver	continuous tuning	none			120 Chan						

Figure 127. Characteristics of new family of radio sets as compared with Radio Sets SCR-508, -528, -608, and -300 and AN/VRC-3.

RADIO SET	USE	MAJOR COMPONENTS	TUNING	ADDITIONAL FEATURES	FREQUENCY RANGE IN MEGACYCLES (MC)						
					20	25	30	35	40	45	50
AN/PRC-10	Infantry	1 transmitter	continuous tuning	none						120 Chan	
AN/PRC-6	As required	1 transmitter ("B" set)	single fixed channel (crystal control)	none							43 chan
AN/PRC-16	As required	1 transmitter ("B" set) 1 battery box	continuous tuning	portable							"B" set 115 chan
AN/VRC-7	As required	1 transmitter ("B" set)	continuous tuning	interphone, remote control							"B" set 115 chan
AN/VRC-8	Armored	1 transmitter ("A" set)	continuous tuning	remote control							"B" set 115 chan
AN/VRC-9	Artillery	1 transmitter ("A" set)	continuous tuning	remote control							
AN/VRC-10	Infantry	1 transmitter ("A" set)	continuous tuning	remote control							"A" set 120 chan
AN/VRC-1	Armored	2 transmitters ("A" set)	continuous tuning	remote control, retransmission, radio-wire integration							"A" set 80 chan "A" set 80 chan
AN/VRC-2	Artillery	2 transmitters ("A" set)	continuous tuning	remote control, retransmission, radio-wire integration							"A" set 120 chan "A" set 120 chan
AN/VRC-3	Infantry	2 transmitters ("A" set)	continuous tuning	remote control, retransmission, radio-wire integration							"A" set 170 chan "A" set 170 chan

Transmitter—Combined transmitter and receiver. Only one can be used at a time.
Armored use includes armored infantry and armored artillery.

Continuous Tuning—can be tuned over entire range by operator.

Average distance ranges—
 "A" set—10 to 15 miles
 "B" set—10 to 15 miles
 AN/PRC-6, -9, -10—3 to 5 miles
 AN/PRC-8—1 mile

Preset—channels preset by radio retransmission, selected by operator.
Change of preset channel must be accomplished by radio retransmission.

Figure 127. Characteristics of new family of radio sets as compared with Radio Sets SCR-508, -528, -608, and -300 and AN/VRC-3—Continued.

11. AN/GRC FAMILY EXPANDED. The AN/GRC family of radio sets has been expanded to include three additional radio sets known as the AN/PRC-8, -9, and -10. This group of radio sets was designed to replace certain of the portable sets for armor and artillery and to provide a new and similar set for infantry. Each of these radio sets, when service-tested and made standard equipment, will be similar to, but smaller than, the present SCR-300. For radio set characteristics, see figures 127 and 128.

12. AN/PRC-6 SET. There is another new set, the AN/PRC-6, now being service-tested, which will net with the "B" set. This set is similar in appearance to the SCR-536, and will find great use within infantry and engineer companies and by artillery forward observers.

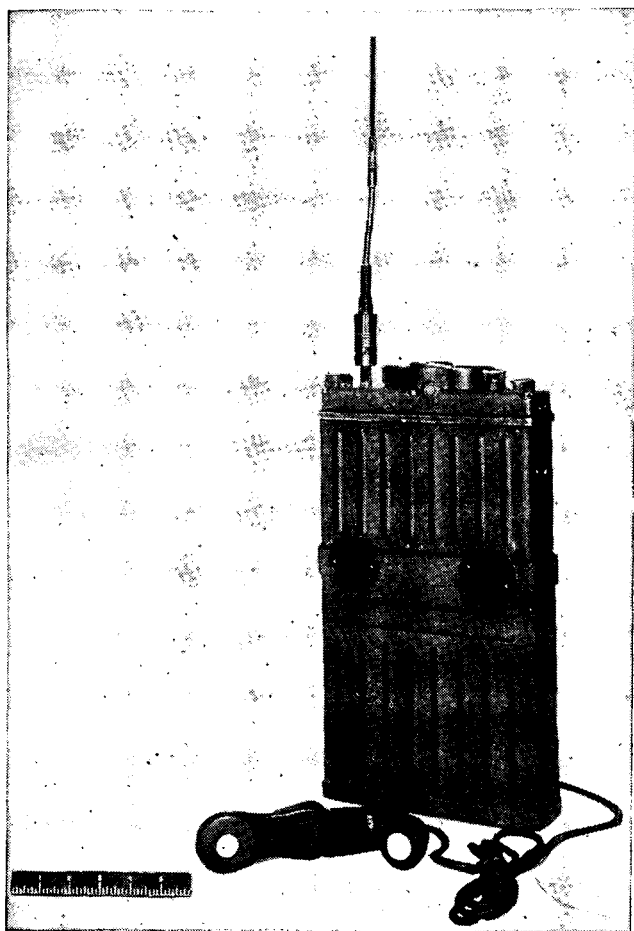


Figure 128. Radio Set AN/PRC-8.

APPENDIX IV

WIRE EQUIPMENT IN THE ARMORED DIVISION

1. GENERAL. Appendix IV contains photographs which illustrate the major types of wire equipment found in the armored division, with descriptive material on some of the more important units.

2. TYPES AND CHARACTERISTICS. The types and characteristics of field wire used in armored units are as shown below.

Wire	Type	Conduc-tors	Weight (pounds per mile)	Trans-mission range (miles)	Supplied on—
W-110-B.....	Twisted pair; rubber and braid insulation.	4 steel, 3 cop-per.	132	11-17	DR-4. DR-5.
W-130.....	Twisted pair; rubber insulation.	6 steel, 1 cop-per.	32	6-10	DR-8. Wire Dis-penser MX-306G.
WD-1/TT..	Twisted pair; extruded polyethylene and nylon insulation.	3 steel, 4 cop-per.	48	12-20	DR-8. DR-4. DR-5. Dis-penser.

a. *Reel Equipment CE-11* (figs. 129-131) consists of a Reel DR-8; carrying handles; square-shaft Axle RL-39; sound-powered Telephone Handset TS-10; and carrying straps. In laying wire with this equipment, the handles are un-snapped from the carrying straps, and the reel then is carried in the hand at the side of the body, allowing the reel to rotate freely. When necessary, the equipment may be strapped to the back for wire laying. To recover wire, the carrying handles are snapped to the carrying straps and the operator rotates the reel by means of the crank and axle as he walks toward the opposite end of the wire. Reel Equipment CE-11 was designed to enable front-line troops to lay short temporary wire lines. This equipment normally will be found in units of company size or larger.

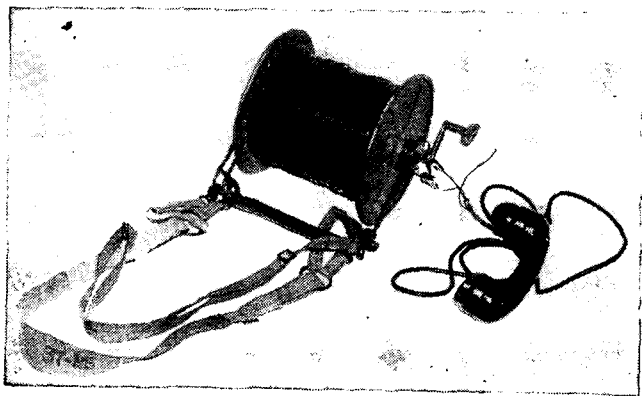


Figure 129. Reel Equipment CE-11.



Figure 130. Reel Equipment CE-11 in carrying position.

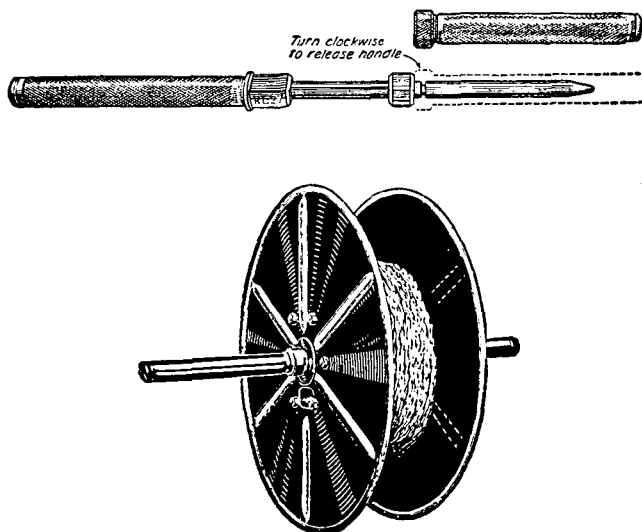


Figure 131. Axle RL-27 showing removable handle, and with Reel DR-4.

b. Reel Units RL-31, RL-31-B, and RL-31-C (fig. 132) are rugged, lightweight, portable units designed to facilitate paying out and recovery of field wire on Reels DR-4 and DR-5. These three reel units are identical except for minor modifications. The Reel Unit RL-31-() has a wire capacity of one mile of Wire W-110 or its equivalent. The wire can be carried on a single Reel DR-5, or on two Reels DR-4, each loaded with one-half mile of wire. The reel unit is a lightweight, portable frame which consists of two H-shaped sections of pipe hinged together at one end. Directly above the hinged joints are two open bronze

bearings with hinged caps, into which the axle is fastened. The axle is a piece of cold rolled steel equipped with a hand-operated brake and a removable hand crank. This equipment may be set up on the ground, mounted in a vehicle, or carried by two men. Reel Unit RL-31-() normally will be found in units of battalion size or larger.

c. *Reel Unit RL-26* (fig. 133) is a transportable wire-laying and wire-recovering machine intended for temporary or permanent installation

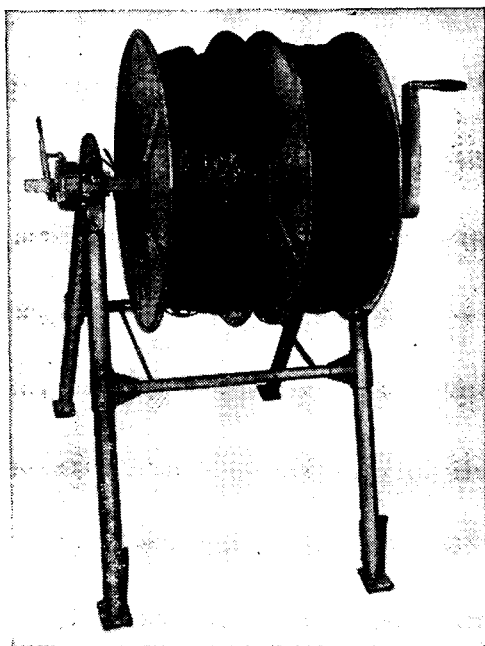


Figure 132. Reel Unit RL-31 loaded with two Reels DR-4.

in motor vehicles. The unit can be operated both while the vehicle is stationary and while it is in motion. It also can be operated dismounted, in temporary positions on the ground. The capacity of the unit is two Reels DR-5 mounted in position for the laying or recovery of field wire lines. The individual reels are replaceable. The wire can be paid out from either reel singly or from both simultaneously. Means are provided for braking the reels to prevent overspinning. A small gasoline

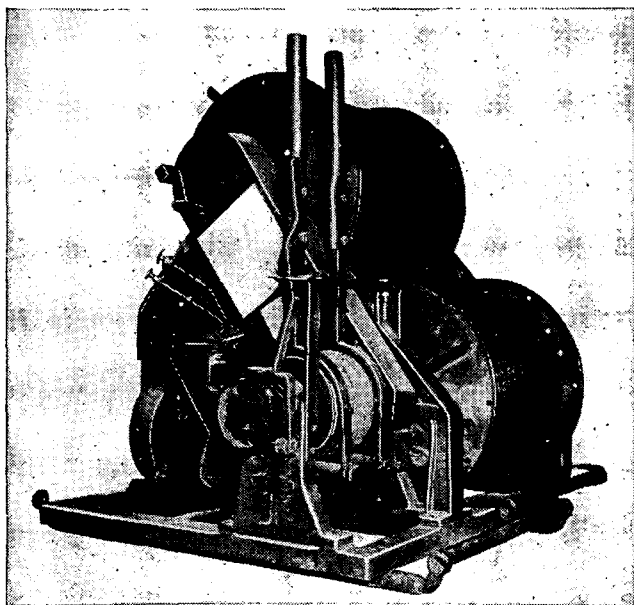


Figure 133. Reel Unit RL-26 with two Reels DR-5 in position.

engine provides power to recover the wire on either reel individually or on both reels simultaneously. If the engine is inoperative, wire can be recovered by handcranking. The weight of the unit fully loaded is approximately 690 pounds. Reel Unit RL-26 normally will be found in units of division size or larger.

3. TELEPHONE AND SWITCHBOARD EQUIPMENT.

Figures 134-138 show the telephone and switchboard equipment normally used in the armored division.



Figure 134. Telephone EE-8.

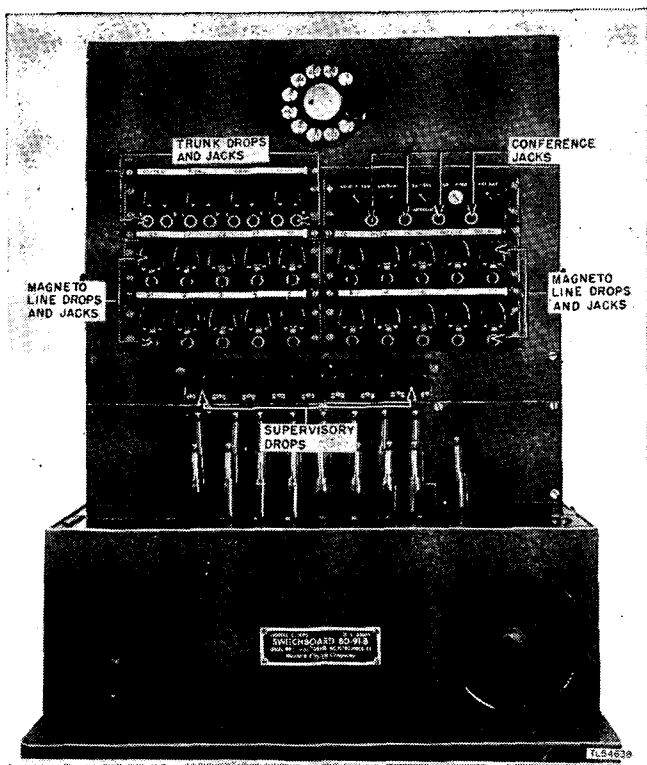


Figure 135. Telephone Central Office Equipment TC-12.

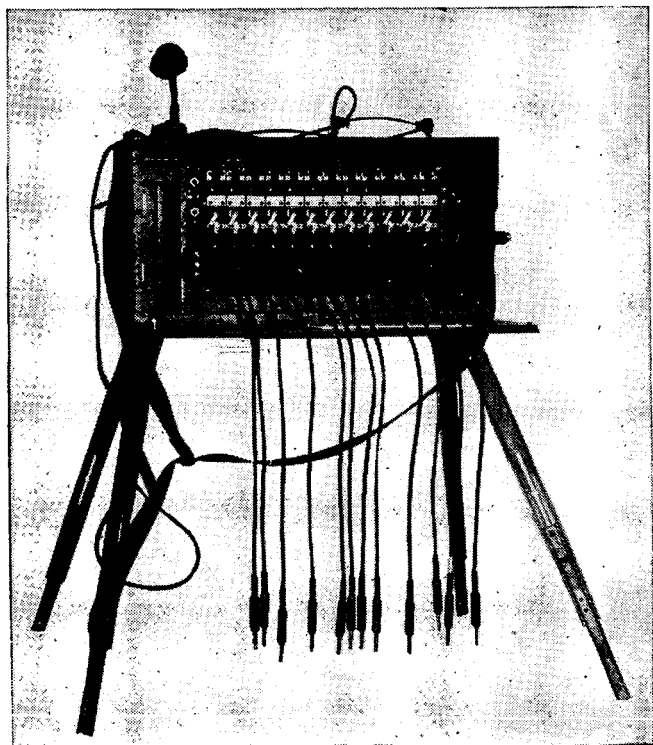


Figure 136. Switchboard BD-72—front view, open.

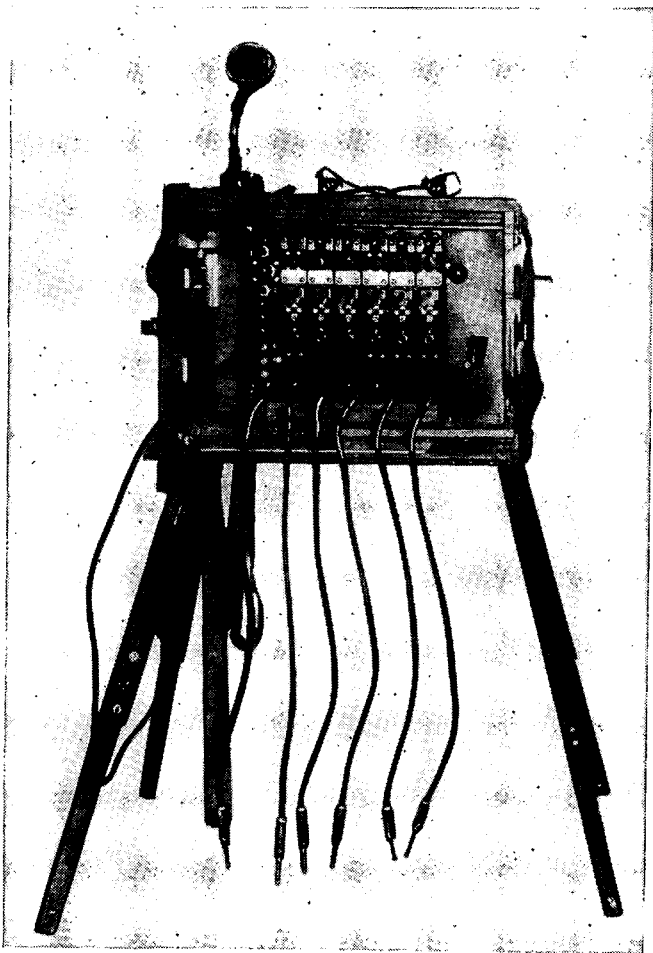


Figure 137. Switchboard BD-71—front view, open.

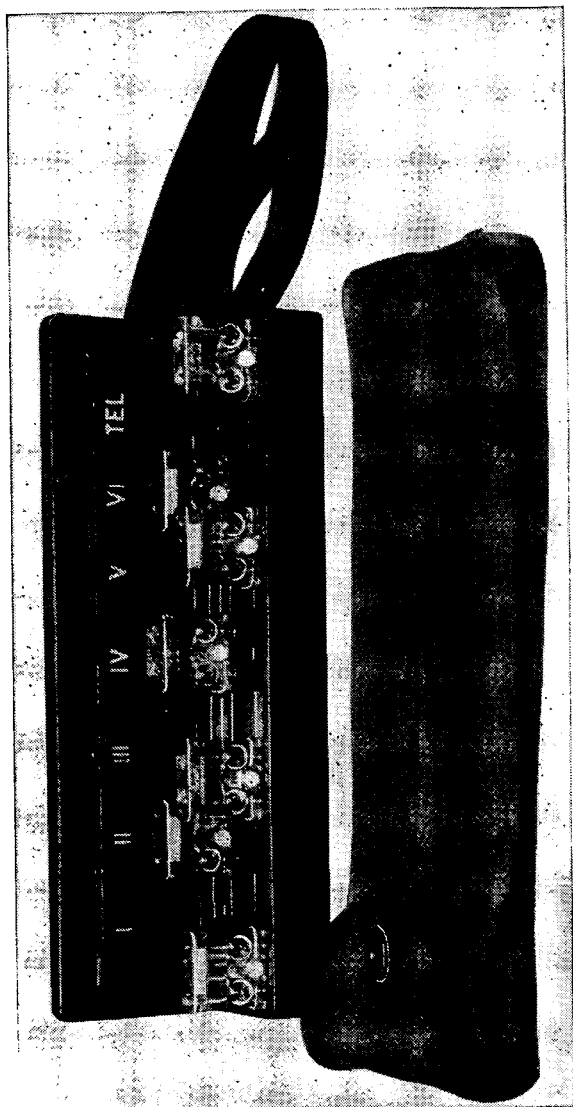


Figure 138. Switchboard SB-18/GT.

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Equipment—Cont'd		
Armored—		
Engineer battalion -----	471	322
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